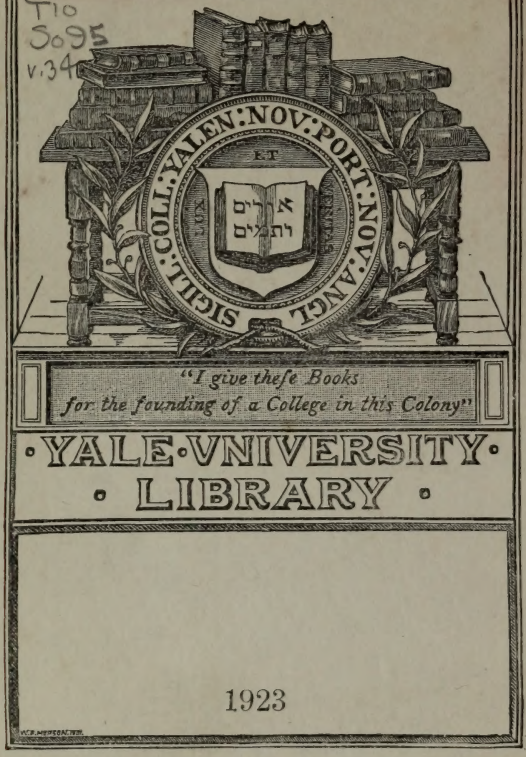
T10
S095
v.34



"I give these Books
for the founding of a College in this Colony"

YALE UNIVERSITY
LIBRARY

1923

TRANSFERRED TO
ALE MEDICAL LIBRARY
IERAL MEDICAL LIBRARY

TRANSACTIONS

OF THE

SOUTHERN SURGICAL ASSOCIATION

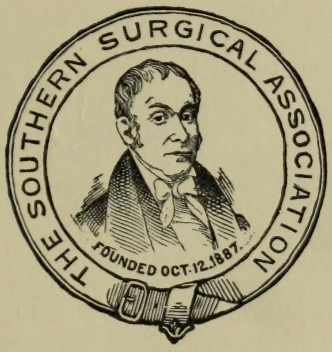
VOLUME XXXIV

THIRTY-FOURTH SESSION

HELD AT PINEHURST, NORTH CAROLINA

DECEMBER 13, 14, AND 15, 1921

EDITED BY H. A. ROYSTER, M.D.



PUBLISHED BY THE ASSOCIATION

1922

The Association does not hold itself responsible for the views enunciated in the papers and discussions published in this volume.

H. A. ROYSTER, M.D., *Secretary*,
RALEIGH, N. C.

T10
So95
v.34

DORNAN, PRINTER
PHILADELPHIA

CONTENTS.

Officers vi
List of Officers from the Organization to the Present Time . vii
List of Meeting Places, with Dates and Presiding Officers . . viii
Honorary Fellows ix
Fellows xi
Geographical List of Fellows xxxiii
Constitution xli
By-Laws xliv
Minutes of the Thirty-fourth Annual Meeting xlvii

President's Address. Retrospect and Prospect. By Randolph Winslow, M.D. 1
Surgical Treatment of Extensive Basal-cell Carcinoma. By J. Shelton Horsley, M.D. 14
The Treatment of Cancer of the Tongue. By Curtis F. Burnam, M.D. 24
Primary Carcinoma of the Female Bladder, with Report of a Case. By I. S. Stone, M.D. 33
Periosteal Sarcoma in Association with Osteomyelitis: Report of Three Cases. By R. L. Rhodes, M.D. 45
Duodenal Diverticula, with the Report of Four Cases. By William A. Downes, M.D. 52
Meckel's Diverticulum. By Alexius McGlannan, M.D. . . 68
Contracture of the Psoas Parvus as an Explanation of Obscure Abdominal Pain in Certain Cases. By Lloyd Noland, M.D. 84
Ideal Cholecystotomy: A Valuable Procedure in Certain Cases of Cholelithiasis. By A. Murat Willis, M.D. 93
The Last Word on Hernia. By Henry O. Marcy, M.D. . . 106
Operation for Diaphragmatic Hernia. By Harvey B. Stone, M.D. 124
Hernia of the Bladder, with Report of a Case. By J. N. Baker, M.D. 131
The Final Results in 183 Cases of Myoma of the Uterus and Myopathic Bleeding Treated with Radium. By C. Jeff Miller, M.D. 149

Conservative Surgery in Nonmalignant Diseases of the Pelvic Organs. By E. P. Hogan, M.D. 157
Traumatic Intracranial Hemorrhage: Report of Ten Operative Cases. By William Perrin Nicolson, M.D. 192
Benign Lesions of Female Breast for which Operation is not Indicated. By Joseph Colt Bloodgood, M.D. 210
The Remaining Breast after Radical Removal of the Opposite Side for Carcinoma. By Hugh H. Trout, M.D. 223
Pelvic Tumors with Sacral Attachments. By Arthur A. Law, M.D. 242
A Skin Suture Without a Fault. By Edward H. Ochsner, M.D. 252
Total Transposition of Viscera. By Henry H. Sherk, M.D. . 255
Jejunal Ulcer Without Previous Gastroenterostomy. By Edward P. Richardson, M.D. 265
Traumatic and Industrial Hernia. Report of the Special Committee of the Medical Section of the American Railway Association: William B. Coley, M.D.; Southgate Leigh, M.D.; John B. Walker, M.D.; C. W. Hopkins, M.D., and J. A. Hutchison, M.D. 290
The Value of the Pneumoperitoneal *X*-ray in Obstetrics and Gynecology Based upon an Experience of Over 300 Cases. By Reuben Peterson, M.D. 308
Another Case of Bullet Wound of the Femoral Artery and Vein Successfully Treated by Ligation of the Artery and Vein and Extirpation of the Injured Segment. By G. Paul LaRoque, M.D. 318
Aneurysm of the Internal Carotid Artery in its Cervical Portion: Report of a Case. By Nathan Winslow, M.D. . . . 323
The Straight Vessels of the Terminal Ileum. By R. L. Payne, M.D. 346
Occlusions of the Mesenteric Vessels. By J. M. Mason, M.D. . 348
Report of Another Case of Septic Thrombosis of the Femoral Vein. By Dyer Findley Talley, M.D. 358
I. Ligation of the Internal Iliac for Enormous Gluteal Aneurysm; II. Cirsoid Aneurysm of the Scalp. By William D. Haggard, M.D. 362
The Treatment of Fibroid Tumors. By Charles N. Cowden, M.D. 385
Special Points in the Surgery of the Stomach. By George W. Crile, M.D. 395
Bleeding Ulcer of the Duodenum Associated with Cholecystitis. By E. Starr Judd, M.D. 400
The Choice of Operations for Duodenal Ulcer. By Le Grand Guerry, M.D. 414
Gastrojejunocolic Fistulas Following Gastroenterostomy. By Charles H. Mayo, M.D. and Fred W. Rankin, M.D. . . . 421

The Factor of Obesity in Surgical Operations. By WALTER C. G. KIRCHNER, M.D. 445
The Value of Mensuration in Harelip Operations. By JAMES E. THOMPSON, M.B., B.S. (LOND.), F.R.C.S. (ENG.) F.A.C.S. . 461
The Use of the Bone Graft in the Treatment of Pott's Disease. By WILLIAM S. BAER, M.D. 469
Surgical Treatment of Facial Paralysis. By C. C. COLEMAN, M.D. 476
The Present Status of Epiplopexy, with a Report of Ten Cases. By JOHN H. GIBBON, M.D. and JOHN B. FLICK, M.D. . . 485
Notes on Enteroptosis. By ROBERT T. MORRIS, M.D. . . . 502
Reconstruction of the Female Urethra and Vesical Sphincter. By EDWARD H. RICHARDSON, M.D. 505
Saddle Nose. By VILRAY P. BLAIR, M.D. 524
A Consideration of Some Nontubercular Kidney Infections. By RAYMOND P. SULLIVAN, M.D. 528
Recurrence of the Benign Prostate. By W. A. BRYAN, M.D. . 542
Ureteral Stricture, an Important Etiological Factor in the So-called Essential Hematurias. By GUY L. HUNNER, M.D., F.A.C.S. 547
Further Notes on Diseases of the Umbilicus. By THOMAS S. CULLEN, M.D. 598

In Memoriam:
LEWIS CRENSHAW BOSHER, M.D. 641
HENRY H. GRANT, M.D. 643
JOSEPH RANSOHOFF, M.D. 645
EDWARD GROVES JONES, M.D. 649
W. M. PERKINS, M.D. 651
FLOYD WILCOX MCRAE, M.D. 653
JOSEPH TABER JOHNSON, M.D. 655
WILLIAM O. ROBERTS, M.D. 659
WILLIAM KOHLMAN, M.D. 661

OFFICERS FOR 1921–1922

PRESIDENT

C. JEFF MILLER, New Orleans, La.

VICE–PRESIDENTS

VILRAY P. BLAIR, St. Louis, Mo.
ROBERT L. GIBBON, Charlotte, N. C.

SECRETARY

HUBERT A. ROYSTER, Raleigh, N. C.

TREASURER

GUY Le ROY HUNNER, Baltimore, Md.

COUNCIL

WILLIAM D. HAGGARD, Nashville, Tenn.
ISAAC S. STONE, Washington, D. C.
JAMES E. THOMPSON, Galveston, Texas.
WILLARD BARTLETT, St. Louis, Mo.
RANDOLPH WINSLOW, Baltimore, Md.

LIST OF OFFICERS

FROM THE ORGANIZATION TO THE PRESENT TIME.

* Deceased.

	President	*Vice-Presidents*	*Secretary*	*Treasurer*
1888.	*W. D. Haggard	R. D. Webb J. W. Sears	*W. E. B. Davis	Hardin P. Cochrane
1889.	*Hunter H. McGuire	*W. O. Roberts *Bedford Brown	*W. E. B. Davis	Hardin P. Cochrane
1890.	*George J. Engelmann	*Berthold E. Hadra Duncan Eve	*W. E. B. Davis	Hardin P. Cochrane
1891.	Lewis S. McMurtry	*J. McFadden Gaston J. T. Wilson	*W. E. B. Davis	Hardin P. Cochrane
1892.	*J. McFadden Gaston	*Cornelius Kollock *George Ben Johnston	*W. E. B. Davis	Hardin P. Cochrane
1893.	*Bedford Brown	*Joseph Price George A. Baxter	*W. E. B. Davis	Hardin P. Cochrane
1894.	*Cornelius Kollock	A. B. Miles J. B. S. Holmes	*W. E. B. Davis	Hardin P. Cochrane
1895.	*Louis McLane Tiffany	Ernest S. Lewis *Manning Simons	*W. E. B. Davis	*Richard Douglas
1896.	Ernest S. Lewis	*Joseph Taber Johnson *Richard Douglas	*W. E. B. Davis	*A. M. Cartledge
1897.	*George Ben Johnston	W. E. Parker *Floyd W. McRae	*W. E. B. Davis	*A. M. Cartledge
1898.	*Richard Douglas	*H. H. Mudd *James A. Goggans	*W. E. B. Davis	*A. M. Cartledge
1899	*Joseph Taber Johnson	F. W. Parham *W. L. Robinson	*W. E. B. Davis	*A. M. Cartledge
1900.	*A. M. Cartledge	*Manning Simons W. P. Nicolson	*W. E. B. Davis	W. D. Haggard
1901.	*Manning Simons	George H. Noble *L. C. Bosher	W. D. Haggard	*Floyd W. McRae
1902.	*W. E. B. Davis	J. Wesley Bovée J. W. Long	W. D. Haggard	*Floyd W. McRae
1903.	J. Wesley Bovée	*Christopher Tompkins Bacon Saunders	W. D. Haggard	*Floyd W. McRae
1904.	*Floyd W. McRae	George S. Brown J. Shelton Horsley	W. D. Haggard	Charles M. Rosser
1905.	*Lewis C. Bosher	J. D. S. Davis I. S. Stone	W. D. Haggard	Charles M. Rosser
1906.	George H. Noble	Stuart McGuire E. Denegre Martin	W. D. Haggard	Charles M. Rosser
1907.	Howard A. Kelly	Rufus E. Fort Hubert A. Royster	W. D. Haggard	Charles M. Rosser
1908.	F. W. Parham	*Henry D. Fry W. F. Westmoreland	W. D. Haggard	Stuart McGuire
1909.	Stuart McGuire	*John Young Brown R. S. Cathcart	W. D. Haggard	Wm. S. Goldsmith
1910.	*W. O. Roberts	Joseph C. Bloodgood Lewis C. Morris	W. D. Haggard	Wm. S. Goldsmith
1911.	Rudolph Matas	Guy L. Hunner J. Garland Sherrill	W. D. Haggard	Wm. S. Goldsmith
1912.	J. M. T. Finney	J. E. Thompson W. P. Carr	W. D. Haggard	Wm. S. Goldsmith
1913.	*John Young Brown	*Ap Morgan Vance Lomax Gwathmey	W. D. Haggard	Le Grand Guerry
1914.	John W. Long	A. C. Scott James F. Mitchell	W. D. Haggard	Le Grand Guerry
1915.	Bacon Saunders	Thomas S. Cullen S. M. D. Clark	W. D. Haggard	Le Grand Guerry
1916.	Thomas S. Cullen	Robert S. Hill Willard Bartlett	W. D. Haggard	Le Grand Guerry
1917.	W. D. Haggard	J. Ernest Stokes F. R. Hagner	H. A. Royster	Le Grand Guerry
1918.	Isaac S. Stone	Le Grand Guerry Carey P. Rogers	H. A. Royster	Guy L. Hunner
1919.	James E. Thompson	Charles R. Robins George A. Hendon	H. A. Royster	Guy L. Hunner
1920.	Willard Bartlett	*C. Jeff Miller Edward G. Jones	H. A. Royster	Guy L. Hunner
1921.	Randolph Winslow	Hugh H. Trout James N. Baker	H. A. Royster	Guy L. Hunner
1922.	C. Jeff Miller	V. P. Blair R. L. Gibbon	H. A. Royster	Guy L. Hunner

LIST OF MEETING PLACES, WITH DATES AND PRESIDING OFFICERS

1888.	Birmingham,	William D. Haggard
1889.	Nashville,	Hunter H. McGuire
1890.	Atlanta,	George J. Engelmann
1891.	Richmond,	Lewis S. McMurtry
1892.	Louisville,	J. McFadden Gaston
1893.	New Orleans,	Bedford Brown
1894.	Charleston,	Cornelius Kollock
1895.	Washington,	Louis McLane Tiffany
1896.	Nashville,	Ernest S. Lewis
1897.	St. Louis,	George Ben Johnston
1898.	Memphis,	Richard Douglas
1899.	New Orleans,	Joseph Taber Johnson
1900.	Atlanta,	A. M. Cartledge
1901.	Richmond,	Manning Simons
1902.	Cincinnati,	W. E. B. Davis
1903.	Atlanta,	J. Wesley Bovée
1904.	Birmingham,	Floyd W. McRae
1905.	Louisville,	Lewis C. Bosher
1906.	Baltimore,	George H. Noble
1907.	New Orleans,	Howard A. Kelly
1908.	St. Louis,	F. W. Parham
1909.	Hot Springs,	Stuart McGuire
1910.	Nashville,	William O. Roberts
1911.	Washington,	Rudolph Matas
1912.	Old Point,	John M. T. Finney
1913.	Atlanta,	John Young Brown
1914.	Asheville,	John W. Long
1915.	Cincinnati,	Bacon Saunders
1916.	White Sulphur Springs,	Thomas S. Cullen
1917.	St. Augustine,	William D. Haggard
1918.	Baltimore,	Isaac S. Stone
1919.	New Orleans,	James E. Thompson
1920.	Hot Springs,	Willard Bartlett
1921.	Pinehurst,	Randolph Winslow

HONORARY FELLOWS

Founder.—Davis, John D. S.	Birmingham, Ala.
1894.—Foy, George	Dublin.
1894.—Jacobs, Charles	Brussels.
1910.—Jones, Robert	Liverpool.
1910.—Lane, Arbuthnot	London.
1917.—Lewis, Ernest S.	New Orleans, La.
Founder.—Long, John Wesley	Greensboro N. C.
1917.—McMurtry, Lewis S.	Louisville, Ky.
1894.—Martin, A.	Berlin.
1902.—Maury, Richard B.	Memphis, Tenn.
1894.—Morisani, O.	Naples.
1910.—Morison, Rutherford	New-Castle-on-Tyne
1910.—Moynihan, B. G. A.	Leeds.
1910.—Myles, Thomas, Sir	Dublin.
1910.—Robson, Mayo	London.
1910.—Stiles, H. J.	Edinburgh.
Founder.—Stone, Isaac S.	Washington, D. C.
*Founder.—Taylor, Hugh M.	Richmond, Va.
1917.—Tuholske, Herman	St. Louis, Mo.
1920.—Vander Veer, Albert	Albany, N. Y.

* Deceased

FELLOWS

1908.—Abell, Irvin, M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, Medical Department, University of Louisville; Visiting Surgeon, Louisville City Hospital; President of Staff, St. Joseph's Infirmary; Consultant to Staff, Children's Free Hospital. 700 Francis Building, Louisville, Ky.

1911.—Allen, Carroll W., M.D. 43 Audubon Boulevard, New Orleans, La.

1921.—Allison, Nathaniel, M.D. Dean and Professor of Clinical Orthopedic Surgery, Washington University Medical School; Surgeon to the St. Louis Children's Hospital, Barnes Hospital, and St. Luke's Hospital. 608 Humboldt Building, St. Louis, Mo.

1915.—Baer, William Stevenson, A.B., M.D. Associate Professor of Clinical Orthopedic Surgery, Johns Hopkins University; Associate in Orthopedic Surgery in charge of Orthopedic Department, Johns Hopkins Hospital; Consulting Orthopedic Surgeon, Home for Incurables; Surgeon-in-chief, Children's Hospital; Visiting Orthopedic Surgeon, Union Protestant Infirmary, Hospital for Women of Maryland, and Robert Garrett Hospital for Children; Consulting Orthopedic Surgeon, Cambridge Hospital, Cambridge, Md., and Sheppard and Enoch Pratt Hospital, Towson, Md. 4 East Madison Street, Baltimore, Md.

1917.—Bagley, Charles, Jr., A.B., M.D. Associate in Experimental Neurology Johns Hopkins University. The Latrobe, Baltimore, Md.

1914.—Bailey, Fred. Warren, B.S., M.D. Associate Professor of Surgery, St. Louis University School of Medicine; Surgeon, St. John's Hospital; Visiting Surgeon, St. Louis City Hospital; Consulting Surgeon, American Car and Foundry Co. 611 Metropolitan Building, St. Louis, Mo.

1905.—Baker, James Norment, M.D. Attending Surgeon, Highland Park Sanitarium; Local Surgeon, A. C. L. Railroad. *Vice-President.* 602 S. Perry Street, Montgomery, Alabama.

1916.—Balfour, Donald Church, M.D. Surgeon to St. Mary's Hospital. Rochester, Minn.

1916.—Barksdale, John W., M.D. Winona, Miss.

1908.—Barr, Richard Alexander, M.D. Professor of Surgery and Clinical Surgery, Medical Department of Vanderbilt University; Major and Surgeon of First Tennessee Infantry, U. S. A., Spanish American War and Phillipine Insurrection; Late Lieut.-Col., M.C., U. S. A. (Hospital Unit "S"). 800 Nineteenth Avenue, S., Nashville, Tenn.

1905.—Barrow, David, M.D. Ex-President Kentucky State Medical Society. 148 Market Street, Lexington, Ky.

1905.—Bartlett, Willard, A.B., A.M., M.D. Associate in Clinical Surgery, Washington University; Demonstrator of Pathological Anatomy, University of Berlin, 1896–97; Voluntary Assistant, University of Strassburg, 1897–98; Professor of Pathology, Marion-Sims College of Medicine, 1898–1901; Demonstrator and Professor of Experimental Surgery, Washington University Medical School, 1901–12; Chairman of the Surgical Staff, St. Louis City Hospital, 1910–12; Surgeon, Missouri Baptist Sanitarium. *Vice-President*, 1916; *President*, 1920. 410 Metropolitan Building, St. Louis, Mo.

1901.—Baughman, Greer, M.D. Professor of Obstetrics, Medical College of Virginia; Visiting Obstetrician to the Virginia Hospital, Memorial Hospital, and Stuart Circle Hospital, 26 North Laurel Street, Richmond, Virginia.

1920.—Beall, Frank Cooke, B.S., M.D. Surgeon-in-Charge, the Johnson-Beall Hospital. 703 Lamar Street, Fort Worth, Texas.

1917.—Bell, Richard Phillips, B.A., M.D. Chief of Staff, King's Daughters Hospital. 202 Professional Building, Staunton, Va.

1916.—Biggs, Montgomery Herman, M.D. Surgeon to Rutherford Hospital; Chief Surgeon C. C. and O. Railway. Rutherfordton, N. C.

1916.—Black, William T., M.D. Associate Professor of Gynecology, University of Tennessee; Visiting Gynecologist to St. Joseph's and Baptist Memorial Hospitals; Associate Visiting Gynecologist, Memphis General Hospital; President of Staff and Visiting Surgeon, Porter Home and Leath Orphan Asylum. Exchange Building, Memphis, Tenn.

1908.—Blair, Vilray Papin, A.M., M.D. Metropolitan Building, St. Louis, Mo.

1906.—Bloodgood, Joseph Colt, M.D. Associate Professor of Surgery, Johns Hopkins University; Associate Surgeon, Johns Hopkins Hospital; Surgeon to the Union Protestant Infirmary; Chief Surgeon to St. Agnes' Hospital. *Vice-President*, 1910. 904 North Charles Street, Baltimore, Md.

1920.—Boland, Frank Kells, A.B., M.D. Professor of Surgery, Emory University; Surgeon to the Grady, the Wesley Memorial, and the Georgia Baptist Hospitals; Piedmont Sanatorium; Davis-Fischer Sanatorium. 436 Peachtree Street, Atlanta, Ga.

1901.—Boldt, Hermann J., M.D. Consulting Gynecologist to Post-Graduate Hospital, Beth Israel Hospital, Stuyvesant Polyclinic, Union Hospital, and St. Vincent's Hospital; Professor Emeritus of Gynecology, Post-Graduate Medical School and Hospital; Honorary Fellow of the American Gynecological Society; Member of the Gynecological Society of Germany; Fellow of the Royal Society of Medicine (London); ex-President of the New York Obstetrical Society; of the German Medical Society of New York; of the Section of Obstetrics and Gynecology of the New York Academy of Medicine. 616 Madison Avenue, New York, N. Y.

1902.—Bonifield, Charles Lybrand, M.D. Professor of Gynecology, Medical Department University of Cincinnati; Member and ex-President, American Association of Obstetricians and Gynecologists; ex-President, Cincinnati Academy of Medicine; ex-President, Cincinnati Obstetrical Society; ex-President, Ohio State Medical Association. 409 Broadway, Cincinnati, Ohio.

1895.—Bovée, J. Wesley, M.D. Fellow and ex-President American Gynecological Society; President of Washington Obstetrical and Gynecological Society; ex-President Medical and Surgical Society of the District of Columbia; Honorary Fellow of Medical Society of Virginia; ex-Chairman of the Section of Gynecology, American Medical Association; Professor of Gynecology, George Washington University; Gynecologist to Columbia, and George Washington University Hospitals; Attending Gynecologist to St. Elizabeth's Hospital for the Insane, Washington, D. C.; President, Medical Board, Woman's Welfare Association; Medical Member, Board of Trustees of the National Training School for Girls. *Vice-President*, 1902; *President*, 1903. The Rochambeau, Washington, D. C.

1908.—Bryan, Robert C., M.D. Professor of Genito-urinary Diseases, Medical College of Virginia; Visiting Surgeon to the Grace, the Memorial, and the Virginia Hospitals. Grace Hospital, Richmond, Virginia.

1910.—Bryan, W. A., M.D. Professor of Surgery and Clinical Surgery, Vanderbilt University; Professor of Oral Surgery, Dental Department, Vanderbilt University; Surgeon, Woman's Hospital, Nashville City Hospital, and Watauga Sanitarium. 146 Eighth Avenue, N., Nashville, Tenn.

1913.—Buist, A. Johnston, M.D. Professor of Gynecology, Medical College of the State of South Caroline; Visiting Gynecologist, Roper Hospital. 279 Meeting Street, Charleston, S. C.

1907.—Burch, Lucius E., M.D. Acting Dean and Professor of Gynecology, School of Medicine, Vanderbilt University; Gynecologist, Woman's Hospital and Vanderbilt University Hospital; Chief Surgeon, Tennessee Central Railroad; late Lieut.-Col., M.C., U. S. Army, A. E. F. 210 Doctor's Building, Nashville, Tenn.

1917.—Burnam, Curtis Field, A.B., M.D. Surgeon, Howard A. Kelly Hospital. 1418 Eutaw Place, Baltimore, Md.

1902.—Caldwell, C. E., A.M., M.D. Professor of Clinical Surgery and Surgical Anatomy in Medical Department, University of Cincinnati; Surgeon to Cincinnati General Hospital. "The Livingston," Seventh and Race Streets, Cincinnati, Ohio.

1910.—Caldwell, Robert, M.D. Professor of Surgical Anatomy, Vanderbilt University; Surgeon to St. Thomas' Hospital. 510 Jackson Building, Nashville, Tenn.

1906.—Cannaday, John Egerton, M.D. Visiting Surgeon, Charleston General, and St. Francis Hospitals. Kanowha Banking and Trust Co. Building, Charleston, W. Va.

1904.—Carothers, Robert, M.D. Surgeon to the Good Samaritan and Children's Hospitals. 409 Broadway, Cincinnati, Ohio.

*1903.—Carr, William P., M.D. Professor of Clinical Surgery, Columbian University; Consulting Surgeon to the Emergency Hospital and University Hospital; Consulting Surgeon to the Washington Asylum Hospital and the Government Hospital for the Insane, Washington, D. C. *Vice-President*, 1912. 1801 K Street, N. W., Washington, D. C.

* Deceased.

1899.—Cathcart, R. S., M.D. Professor of Abdominal Surgery, Medical College of the State of South Carolina; Surgeon-in-chief, Roper Hospital, Charleston, S. C.; Surgeon, Atlantic Coast Line Railway, Charleston Consolidated Railway and Lighting Co., The Citadel—the Military College of South Carolina, and the Confederate Home College, Charleston, S. C. *Vice-President*, 1909. 75 Hasell Street, Charleston, South Carolina.

1907.—Clark, John G., M.D. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital. 2017 Walnut Street, Philadelphia, Penna.

1907.—Clark, S. M. D., M.D. Professor of Gynecology and Clinical Obstetrics, Tulane Medical Department; Visiting Surgeon, Charity Hospital. 1435 Harmony Street, New Orleans Louisiana.

1919.—Clopton, Malvern Bryan, M.D. Associate in Surgery, Washington University Medical School; Visiting Surgeon, St. Luke's Hospital; Associate Surgeon, Barnes Hospital and Children's Hospital. Humboldt Building, St. Louis, Missouri.

1893.—Cocram, Henry S., M.D. 108 Baronne Street, New Orleans, La.

1908.—Coffey, Robert C., M.D. Secretary, Oregon State Board of Medical Examiners; Councillor, Oregon State Medical Association. Stevens Building, Portland, Oregon.

1909.—Cole, Herbert Phalon, M.D. Van Antwerp Building, Mobile, Ala.

1916.—Coleman, Claude C., M.D. Professor of Oral Surgery and Anesthesia; Associate Professor in Operative Surgery, Medical College of Virginia; Attending Surgeon, Hospital Division, Medical College of Virginia. 503 Professional Building, Richmond, Va.

1902.—Coley, William B., M.D. Professor of Clinical Cancer Research, Cornell University Medical College; Attending Surgeon to Hospital for Ruptured and Crippled, and Memorial Hospital. 6 West Fiftieth Street, New York, N. Y.

1914.—Cousins, William Lewis, M.D. Surgeon-in-Chief, St. Barnabas' Hospital; Consulting Surgeon, Maine General Hospital. 231 Woodford Street, Portland, Maine.

1916.—Cowden, Charles N., M.D. Surgeon to City Hospital; Gynecologist to St. Thomas' Hospital. Hitchcock Bldg., Nashville, Tenn.

1907.—Crawford, Walter W., M.D. Ex-President, Southern Medical Association; ex-President, Mississippi State Medical Association; Surgeon to South Mississippi Infirmary; Lieut.-Col., M.C., U. S. Army; Chief Surgical Service, Base Hospital, Camp Shelby, 1917–18; Chief Surgical Service, Base Hospital 79, 1918–19. Hattiesburg, Miss.

1902.—Crile, George W., M.D. Professor of Surgery, The School of Medicine of Western Reserve University; Visiting Surgeon to Lakeside Hospital. 1021 Prospect Avenue, Cleveland, Ohio.

1908.—Crisler, Joseph Augustus, B.S., M.D. Exchange Building, Memphis, Tenn.

1920.—Crook, Jere Lawrence, A.M., M.D. Owner and Chief Surgeon of the Crook Sanitarium; President of the Southern Medical Association (1921); Division Surgeon of the Illinois Central Railroad; Local Surgeon of the N. C. and St. L., and G. M. & N. Railroads; Surgeon for U. S. Government in the Marine Hospital Service. 110 W. Baltimore Street, Jackson, Tenn.

*1917.—Cullen, Ernest K., M.B. Associate Professor of Gynecology, Detroit College of Medicine and Surgery; Attending Surgeon in Gynecology, Harper Hospital; Consultant Gynecologist, St. Mary's Hospital. David Whitney Building, Detroit, Mich.

1906.—Cullen, Thomas Stephen, M.B. Professor of Clinical Gynecology, Johns Hopkins University; Visiting Gynecologist, Johns Hopkins Hospital; Consultant in Abdominal Surgery, Church Home and Infirmary; Fellow of the American Gynecological Society; Honorary Member to La Societa Italiana Ostettricia Ginecologia, Rome; Corresponding Member of the Gesellschaft f. Geburtshülfe, Leipzig; Honorary Fellow of the Edinburgh Obstetrical Society. *Vice-President*, 1915; *President*, 1916. 20 E. Eager Street, Baltimore, Maryland.

1907.—Danna, Joseph A., M.D. Chief Visiting Surgeon, Charity Hospital. Charity Hospital, New Orleans, Louisiana.

1910.—Davis, John Staige, M.D. Associate in Clinical Surgery, Johns Hopkins University; Assistant Visiting and Dispensary Surgeon, Johns Hopkins Hospital; Visiting and Plastic Surgeon to the Union Memorial Hospital, the Hospital for the Women of Maryland, and the Children's Hospital of Baltimore. The Severn, Baltimore, Md.

* Deceased.

1900.—Deaver, John B., M.D. Surgeon-in-Chief to the Lankenau Hospital; John Rhea Barton Professor of Surgery, University of Pennsylvania; Surgeon to the Hospital of the University of Pennsylvania. 1634 Walnut Street, Philadelphia.

1921.—Dixon, W. C., M.D. Gynecologist to the Nashville City Hospital, Vanderbilt University Hospital, and St. Thomas' Hospital; Associate Professor of Gynecology in the Medical Department of Vanderbilt University. 216 Doctors' Building, Nashville, Tenn.

1896.—Doughty, W. H., M.D. Dean and Professor of Surgery, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina, and Georgia and Florida Railroads, and Augusta-Aiken Railway and Electric Corporation; President of the Georgia State Board of Health. 822 Greene Street, Augusta, Ga.

1921.—Dowman, Charles Edward, A.B., M.D. Assistant Professor of Surgery, in charge of Neurological Surgery, Medical Department of Emory University; Attending Surgeon, Wesley Memorial Hospital; Attending Neurological Surgeon, Grady Memorial Hospital, Colored Division; Attending Neurological Surgeon, Scottish Rite Hospital for Crippled Children; Attending Neurological Surgeon, Georgia Baptist Hospital; Attending Neurological Surgeon, Piedmont Sanatorium; Attending Neurological Surgeon, Davis-Fischer Sanatorium. 78 Forrest Avenue, Atlanta, Ga.

1914.—Downes, William Augustus, M.D. Assistant Professor of Clinical Surgery, Columbia University, College of Physicans and Surgeons; Attending Surgeon, St. Luke's, Memorial and Babies' Hospitals; Consulting Surgeon, Manhattan State Hospital, Hospital for Ruptured and Crippled, New York, Infirmary for Women and Children, New York, United Hospital, Port Chester. 424 Park Avenue, New York, N. Y.

1916.—Du Bose, Francis Goodwin, M.D. Surgeon-in-Charge of Vaughan Memorial Hospital. Selma, Ala.

1890.—Earnest, John G., M.D. Consulting Gynecologist to the Grady Hospital; Professor Emeritus of Clinical Gynecology, Emory University; Member of the Surgical Staff, St. Joseph's Infirmary. 828 Candler Building, Atlanta, Ga.

1907.—Elbrecht, O. H., M.D. Visiting Surgeon, St. Louis City Hospital; Consulting Surgeon to St. Louis Maternity, Bethesda and Missouri Pacific Railroad Hospitals. 423 Metropolitan Building, St. Louis, Mo.

1891.—Elkin, William Simpson, M.D. Dean and Professor of Gynecology in the School of Medicine, Emory University; ex-President of the Atlanta Society of Medicine; Consulting Surgeon to Grady Hospital; Gynecologist to Wesley Memorial Hospital. 1029 Candler Building, Atlanta, Ga.

1904.—Finney, J. M. T., M.D. Associate Professor of Surgery, Johns Hopkins University; Surgeon to Out-patients, Johns Hopkins Hospital. *President*, 1912. 1300 Eutaw Place, Baltimore, Md.

1920.—Fisher, William Alexander, Jr., M.D. Associate in Clinical Surgery, Johns Hopkins University; Assistant Visiting Surgeon, Johns Hopkins Hospital; Visiting Surgeon, Union Memorial Hospital, Church Home and Infirmary, Hospital for the Women of Maryland, Children's Hospital School. 715 Park Avenue, Baltimore, Md.

1917.—Fletcher, Marshall H., M.D. Chief of Staff, Asheville Mission Hospital; Surgeon Clarence Barker Memorial Hospital and Dispensary, Biltmore. 199 Haywood Street, Asheville, N. C.

1905.—Frank, Louis, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Surgeon to Louisville City Hospital; Surgeon, Norton Memorial Infirmary; Consulting Surgeon, Children's Free Hospital. 400 Atherton Building, Louisville, Ky.

1916.—Frazier, Charles H., M.D. Professor of Clinical Surgery, University of Pennsylvania. 1724 Spruce Street, Philadelphia, Pa.

1917.—Gerster, John C. A., M.D. Assistant Professor of Clinical Surgery, Cornell University Medical College. 18 East 78th Street, New York, N. Y.

1917.—Gessner, Hermann B., A.M., M.D. Professor of Operative and Clinical Surgery in Tulane University; Chief Visiting Surgeon to Charity Hospital; Junior Surgeon to Touro Infirmary. 1105 Maison Blanche, New Orleans, La.

1920.—Gibbon, John H., M.D. Professor of Surgery, Jefferson Medical College; Surgeon to the Pennsylvania and Jefferson Hospitals; Consulting Surgeon, Bryn Mawr Hospital; Col., Medical Reserve Corps, U. S. A. 1608 Spruce Street, Philadelphia, Pa.

1913.—Gibbon, Robert L., M.D. Charlotte, N. C.

1918.—Gilcreest, Edgar L., A.B., M.D. 3698 California St., San Francisco, Cal.

1900.—Goldsmith, W. S., M.D. *Treasurer*, 1909–1912. 262 Jackson Street, Atlanta, Ga.

1905.—Guerry, Le Grand, M.D. Surgeon, Columbia Hospital. *Treasurer*, 1913–1918. *Vice-President*, 1918. Columbia, S. C.

1896.—Gwathmey, Lomax, M.D. Attending Surgeon, Norfolk Protestant Hospital, Out-patient Department; Consulting Surgeon, Parish Memorial and U. S. P. H. Hospitals; Co-proprietor, St. Christopher's Hospital. *Vice-President*, 1913. Norfolk, Va.

1896.—Haggard, William David, M.D. Professor of Surgery and Clinical Surgery, Vanderbilt University; Surgeon to St. Thomas' Hospital. *Treasurer*, 1900; *Secretary*, 1901–1916; *President*, 1917. 706 Church Street, Nashville, Tenn.

1910.—Hagner, Francis Randall, M.D. Professor of Genito-urinary Surgery, George Washington University; Attending Genito-urinary Surgeon, George Washington University Hospital; Attending Surgeon, Garfield Memorial Hospital. *Vice-President*, 1917. The Farragut, Washington, D. C.

1892.—Hall, Rufus Bartlett, A.M., M.D. Emeritus Professor of Gynecology and Clinical Gynecology, Ohio-Miami Medical College, Medical Department, University of Cincinnati; Surgeon-in-Charge of the Hall Hospital; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Ohio State Medical Society; Member of the British Medical Society; ex-President of the Cincinnati Academy of Medicine; ex-President of the Cincinnati Obstetrical Society; Member of the American Medical Association. 628 Elm Street, Cincinnati, Ohio.

1910.—Hanes, Granville S., M.D. Professor of Diseases of the Rectum, Medical Department of the University of Louisville; Surgeon to the Louisville Public Hospital, John N. Norton Memorial Infirmary. Francis Building, Louisville, Ky.

1896.—Heflin, Wyatt, M.D. Gynecologist to the Hillman Hospital; Member of Surgical Staff of South Highlands Infirmary 3216 Cliff Road, Birmingham, Ala.

1917.—Helms, John Sullivan, A.B., M.D. Chief of Staff and Director Division of Surgery, the Bayside Hospital; Chief Surgeon, Tampa Children's Home; Consulting Surgeon, Gordon Keller Memorial Hospital. Tampa, Fla.

1905.—Hendon, George A., M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Surgeon, St.

Anthony's Hospital, Louisville City Hospital. *Vice-President.* 546 Francis Building, Louisville, Ky.

1918.—Henson, James W., M.D. Associate Professor of Surgery, Medical College of Virginia; Member of Surgical Staff of Virginia and Memorial Hospitals; Surgeon to the Southern Railway. 405 N. Allen Avenue, Richmond, Va.

1889.—Hill, Robert Somerville, M.D. Surgeon to the Laura Hill Hospital; Life Councillor, Medical Association of the State of Alabama; Member of the Alabama State Board of Health; ex-President of the Montgomery County Medical Association; former Surgeon of the Second Regiment, Alabama State Militia. *Vice-President,* 1916. Montgomery, Ala.

1913.—Hodgson, Fred G., M.D. Professor of Orthopedic Surgery, Medical Department, Emory University; Orthopedic Surgeon to Grady, Wesley Memorial, Georgia Baptist, and Mac Vicar Hospitals. 746 Peachtree Street, Atlanta, Ga.

1911.—Hogan, Edgar P., M.D. Associate Professor of Gynecology and Abdominal Surgery, Graduate School of Medicine of the University of Alabama; Resident Surgeon and Gynecologist to the Hillman Hospital. 412–14 Empire Building, Birmingham, Ala.

1906.—Holden, Gerry R., M.D. Formerly House Surgeon, Roosevelt Hospital, New York City; formerly Resident Gynecologist, Johns Hopkins Hospital, and Assistant in Gynecology, Johns Hopkins Medical School. 513 Laura Street, Jacksonville, Fla.

1900.—Horsley, John Shelton, M.D. Surgeon-in-Charge, St. Elizabeth's Hospital. *Vice-President,* 1904. 617 West Grace Street, Richmond, Va.

1921.—Hupp, Frank Le Moyne, A.M., M.D. Attending Surgeon to Ohio Valley General Hospital; Consulting Surgeon to Reynolds Memorial Hospital, Glendale and to Sheltering Arms Hospital, Hansford. 61 Fourteenth Street, Wheeling, W. Va.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University; Consulting Gynecologist; Frederick City Hospital, Frederick, Md., and Hagerstown Hospital, Hagerstown, Md.; Visiting Gynecologist, the Johns Hopkins Hospital, Church Home, Hebrew Hospital, Hospital for the Women of Maryland, and Union Memorial Hospital. *Vice-President,* 1911. *Treasurer.* 2305 St. Paul Street, Baltimore, Md.

1900.—Ill, Edward Joseph, M.D. Gynecologist and Medical Director Emeritus, St. Michael's Hospital; Gynecologist and Supervising Obstetrician Emeritus, Hospital of St. Barnabas; Consulting Gynecologist, Newark Beth Israel Hospital, Newark City, Newark Memorial, and St. James Hospitals, Newark; Mountainside Hospital, Montclair; St. Elizabeth's Hospital, Elizabeth; Somerset Hospital, Somerville; Muhlenberg Hospital, Plainfield; Perth Amboy City Hospital, Perth Amboy; Stumpf Memorial Hospital, Kearney; All Souls' and Morristown Hospitals, Morristown; New Jersey State Village for Epileptics, Skillman. 1002 Broad Street, Newark, N. J.

*1912.—Jackson, William R., M.D. Consulting Surgeon to Southern Infirmary, Mobile, Ala. 164 St. Michael Street, Mobile, Ala.

1908.—Jonas, Ernst, M.D. Clinical Professor of Surgery, Medical Department, Washington University; Chief of Surgical Clinic, Washington University Hospital; Gynecologist to the Jewish Hospital; Surgeon to the Martha Parsons Hospital for Children; Fellow of the American Association of Obstetricians and Gynecologists. 4495 Westminster Place, St. Louis, Missouri.

1902.—Jordan, William Mudd, M.D. 915 Empire Building, Birmingham, Ala.

1912.—Judd, Edward Starr, M.D. Surgeon to Mayo Clinic, Rochester, Minn.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888–89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1889–99; Emeritus Professor of Gynecology, Johns Hopkins University; Consulting Gynecologist to Johns Hopkins Hospital; Membre Associé Etranger de la Société Obstétricale et Gynécologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow, Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member of Washington Academy of Sciences; Fellow of the American Gynecological Society; Commander of the Order of Leopold II (1920). *President*, 1907. 1418 Eutaw Place, Baltimore, Maryland.

1917.—Kerr, Harry Hyland, M.D., C.M. Clinical Professor of Surgery, George Washington University Medical

* Deceased.

School; Attending Surgeon Garfield Memorial and Children's Hospitals; Consulting Surgeon, Providence Hospital. 1742 N. Street, N. W., Washington, D. C.

1907.—KIRCHNER, WALTER C. G., M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital; Visiting Surgeon, City Hospital; Consulting Surgeon, St. John's Hospital. Metropolitan Building, 508 N. Grand Avenue, St. Louis, Mo.

1914.—LANDRY, LUCIAN H., M.D. Demonstrator of Operative Surgery and Assistant Professor of Clinical Surgery, Tulane University of Louisiana, School of Medicine; Senior Associate in Surgery, Touro Infirmary; Visiting Surgeon, Charity Hospital. 2255 St. Charles Avenue, New Orleans, La.

1913.—LAROQUE, G. PAUL, M.D. Associate Professor of Surgery, Medical College of Virginia; Surgeon, Memorial Retreat, Dooley, St. Philip, Virginia, and Sheltering Arms Hospitals. 603 East Grace Street, Richmond, Va.

1916.—LAW, ARTHUR AYER, M.D. Associate Professor of Surgery, University of Minnesota Medical School and Mayo Foundation; Lieut.-Col., M.C., U. S. Army, Commanding Base Hospital No. 26 in A. E. F.; Surgeon, University of Minnesota Hospital and University Hospital; Assistant Chief of University Hospital. Syndicate Building, Minneapolis, Minn.

1917.—LEDBETTER, SAMUEL L., JR., M.D. Visiting Surgeon. St. Vincent's Hospital; Associate Surgeon, Hillman Hospital, 516 Empire Building, Birmingham, Ala.

1894.—LEIGH, SOUTHGATE, M.D. Surgeon and Gynecologist, Sarah Leigh Hospital and Clinic; Chief Surgeon, Virginian Railway Co.; Consulting Surgeon, S. A. L. Railway; Surgeon, N. & W., Penn., C. & O. and A. C. L. Railways; ex-President, Norfolk County Medical Society, Medical Society of Virginia; Tri-State Medical Association, Seaboard Medical Association, A. C. L. Railway Surgeons' Association, N. & W. Railway Surgeons Association, C. & O. Railway Surgeons Association, Southern States Association Railway Surgeons. 109 College Place, Norfolk, Va.

1912.—LEWIS, BRANSFORD, M.D. Century Building, St. Louis, Mo.

1914.—LEWIS, DEAN, A.B., M.D. Professor of Surgery, Rush Medical College; Attending Surgeon, Presbyterian Hospital; Consulting Surgeon, Anne W. Durand Hospital. 122 South Michigan Avenue, Chicago, Ill.

1900.—Lloyd, Samuel, M.D. Emeritus Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon to the Lutheran Hospital; Consulting Surgeon to the Post-Graduate Hospital, St. Francis Hospital, Italian Hospital, St. Mary's Hospital (Orange, N. J.), St. Francis Hospital, (Poughkeepsie, N. Y.) and to the Benedictine Sanitarium, (Kingston, N. Y.) 50 East Forty-second Street, New York, N. Y.

1921.—Lower, William Edgar, M.D. Associate Surgeon, Lakeside Hospital; Visiting Surgeon, Luthern Hospital; Director of Surgery, Mt. Sinai Hospital; Associate Professor of Surgery, Western Reserve University. Euclid Avenue at Ninety-third Street, Cleveland, Ohio.

1904.—Lupton, Frank A., M.D. 816 Woodward Building, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1911.—McGlannan, Alexius, M.D. Professor of Surgery, University of Maryland, and College of Physicians and Surgeons, Baltimore. 115 West Franklin Street, Baltimore, Md.

1893.—McGuire, Stuart, M.D. Professor of Surgery, Medical College of Virginia; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon to the Memorial and Allied Hospitals. *Vice-President*, 1906; *Treasurer*, 1908; *President*, 1909. 513 East Grace Street, Richmond, Va.

1905.—MacLean, Henry Stuart, M.D. Surgeon, Grace Hospital; Visiting Surgeon, Memorial Hospital. 401 West Grace Street, Richmond, Va.

1915.—Maes, Urban, M.D. Professor of Clinical and Operative Surgery, School of Medicine, Tulane University of Louisiana; Visiting Surgeon, Charity Hospital; Senior Associate in Surgery, Touro Infirmary; Surgical Consultant, United States Marine Hospital, New Orleans. 1671 Octavia Street, New Orleans, La.

1912.—Malone, Battle, M.D. 624 Exchange Building, Memphis, Tenn.

1891.—Marcy, Henry Orlando, A.M., M.D., LL.D. Surgeon to the Private Hospital for Women, Cambridge; ex-President of the American Medical Association; President of the Section on Gynecology, Ninth International Medical Congress; late President of the American Academy of Medicine; Member of the British Medical Association, Massachusetts Medical

Society, Boston Gynecological Society; Fellow of the American College of Surgeons; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; late Surgeon, U. S. A. 180 Commonwealth Avenue, Boston, Mass.

1899.—MARTIN, E. DENEGRE, M.D. Professor of Surgery, Post-Graduate Department, Tulane Medical College; Visiting Surgeon to Charity Hospital. *Vice-President,* 1906. 3513 Prytania Street, New Orleans, La.

1913.—MARTIN, FRANKLIN H., M.D. Professor of Gynecology, Post-Graduate School; Consulting Staff, St. Luke's Hospital. Editor, *Surgery, Gynecology and Obstetrics.* 30 North Michigan Avenue, Chicago, Ill.

1904.—MASON, J. M., M.D. Gynecologist to St. Vincent's Hospital; Surgeon to Hillman Hospital. 1915 Sixteenth Avenue, S., Birmingham, Ala.

1899.—MASTIN, WILLIAM M., M.D. Fellow of the American Surgical Association; Member of the American Association of Genito-urinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—MATAS, RUDOLPH, M.D., LL.D. Professor of Surgery, School of Medicine, Tulane University; Senior, Department of Surgery, Touro Infirmary; Chief of Service, Surgical Division, Charity Hospital; ex-President, Louisiana State Medical Society, 1894–5; Vice-President, American Medical Association 1910. *President,* 1911. 3523 Prytania Street, New Orleans, La.

1917.—MAURY, JOHN M., M.D. Professor of Gynecology, University of Tennessee, College of Medicine; Gynecologist, Memphis General and Baptist Memorial Hospitals. Bank of Commerce Building, Memphis, Tenn.

1902.—MAYO, CHARLES H., M.D., A.M., LL.D., D.Sc., F.R.C.S. (ENG.). Surgeon to the Mayo Clinic, St. Mary's Hospital; Professor of Surgery, Medical School, and of the Mayo Foundation, University of Minnesota. Rochester, Minn.

1898.—MILLER, C. JEFF, M.D. Professor of Obstetrics and Clinical Gynecology, School of Medicine, Tulane University of Louisiana; Chief of the Division of Obstetrics and Gynecology, Charity Hospital; Chief of the Division of Gynecology, Touro Infirmary; Professor of Abdominal Surgery, Post-Graduate School of Medicine, Tulane University; Member of the American Gynecological Society. *Vice-President,* 1920. 1638 Joseph Street, New Orleans, La.

1916.—Miller, Edward Howe, Jr., M.D. Surgeon, Danville General Hospital; Surgeon to Southern Railway; Surgeon to Providence Hospital. 6 Chestnut Place, Danville, Va.

1917.—Miller, Robert Talbott, Jr., M.D. Professor of Surgery, University of Pittsburgh Medical School; Surgeon to Mercy Hospital. Diamond Bank Building, Pittsburgh, Pa.

1907.—Mitchell, James F., M.D. Surgeon to Emergency Hospital. *Vice-President*, 1914. 1344 Nineteenth Street, Washington, D. C.

1921.—Mixter, Charles Galloupe, M.D. Assistant Surgeon, Children's Hospital, Boston, Mass.; Consulting Surgeon, Jordon Hospital, Plymouth, Mass.; Consulting Surgeon, Cable Hospital, Ipswich, Mass.; Consulting Surgeon, Leonard Morse Hospital, Natick, Mass.; Instructor in Surgery, Graduate School of Medicine, Harvard University. 180 Marlborough Street, Boston, Mass.

1901.—Mixter, Samuel Jason, M.D. Surgeon, Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough Street, Boston, Mass.

1911.—Moore, John Thomas, M.D. Surgeon, St. Joseph's Infirmary, and Municipal Hospital. Kress Medical Bldg., Houston, Texas.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown University Hospital and Columbia Hospital for Women. 2426 Pennsylvania Avenue, Washington, D. C.

1902.—Morris, Lewis C., M.D. Professor of Gynecology and Abdominal Surgery, Graduate School of Medicine, University of Alabama; Gynecologist and Abdominal Surgeon, Hillman and St. Vincent's Hospitals; Surgeon, Children's Hospital; Consulting Surgeon, Employees Hospital, B. C. I. and Ry. Co.; Member, Jefferson County Medical Society, Medical Association, State of Alabama, American Medical Association, American Association of Obstetricians and Gynecologists. *Vice-President*, 1910. 1203–7 Empire Building, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Emeritus Professor of Surgery, New York Post-Graduate Medical School and Hospital; Visiting Surgeon, Broad Street Hospital. 616 Madison Avenue, New York, N. Y.

1916.—Newell, E. Dunbar, M.D. Surgeon to the Newell Sanitarium; Consulting Surgeon to the Erlanger Hospital;

Surgeon, C. N. O. & T. P., A. G. S., and Southern Railways; Surgeon, N. C. & St. L. and W. & A. Chattanooga, Tenn.

1889.—Nicolson, William Perrin, M.D. Surgeon and President, Medical Board, St. Joseph's Infirmary; Consulting Surgeon, Grady Memorial Hospital; ex-President of the Georgia Medical Association; ex-Secretary, Surgical Section, Pan-American Medical Congress. *Vice-President,* 1900. Healey Building, Atlanta, Ga.

1890.—Noble, George H., M.D., D.C.L. Professor of Clinical Gynecology, Atlanta Medical College; Gynecologist to Grady Hospital; Fellow of the American Gynecological Society and the American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association. *Vice-President,* 1901; *President,* 1906. 186 South Pryor Street, Atlanta, Ga.

1920.—Noland, Lloyd, M.D. Chief Surgeon Tennessee Coal, Iron and Railroad Company Employees' Hospital. Birmingham, Ala.

1911.—Norris, Henry, M.D. Rutherfordton, N. C.

1901.—Ochsner, A. J., M.D., LL.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief, Augustana and St. Mary's Hospital. 2106 Sedgwick Street, Chicago, Ill.

1903.—Ochsner, Edward H., M.D. Surgeon to Augustana Hospital. 2155 Cleveland Avenue, Chicago, Illinois.

1902.—Oliver, John Chadwick, M.D. Acting Dean and Professor of Surgery, Medical College of the University of Cincinnati; Director of the Surgical Service, Cincinnati General Hospital; Surgeon to Christ Hospital. 628 Elm Street, Cincinnati, Ohio.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic; One of the Chief Surgeons, Touro Infirmary. *Vice-President,* 1899; *President,* 1908. 1429 Seventh Street, New Orleans, La.

1910.—Payne, Robert Lee, M.D. Surgeon to St. Vincent's Hospital, Southern Railway, Clyde and Chesapeake Steamship Companies; Consulting Surgeon, Seaboard Air Line Railway; Chief Surgeon, Norfolk-Southern Railroad, and Roanoke River Railway. Tazewell Building, Norfolk, Va.

1916.—Peck, Charles H., M.D. Professor of Clinical Surgery, Columbia University; Surgeon to Roosevelt Hospital;

Consulting Surgeon to French, Ruptured and Crippled, and Memorial Hospitals. 30 W. Fiftieth Street, New York, N. Y.

1921.—Pemberton, John de J., M.D. Section of Surgery, Mayo Clinic. Rochester, Minn.

1920.—Peple, W. Lowndes, M.D. Professor of Clinical Surgery, Medical College of Virginia; Chief of Surgical Services of the Memorial, Dooley and St. Philip Hospitals; Chairman of Staff and Chief of Surgical Service of the Virginia Hospital. 1209 W. Franklin Street, Richmond, Va.

*1899.—Perkins, W. M., M.D. Professor of Clinical Surgery, Post-Graduate Medical School, Tulane University; Instructor in Clinical Surgery, School of Medicine, Tulane University; Visiting Surgeon to the Charity Hospital. 830 Canal Street, New Orleans, Louisiana.

1908.—Peterson, Reuben, A.M., M.D. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist-in-Chief to the University of Michigan Hospital. Ann Arbor, Mich.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1917.—Pool, Eugene H., M.D. Consultant Surgeon to French Hospital, Port Chester Hospital, Central Islip State Asylum, New York Orthopedic Hospital, and Home for Incurables. 107 East Sixtieth Street, New York, N. Y.

1900.—Porter, Miles F., M.A., M.D. Surgeon to St. Joseph and Hope-Methodist Hospitals; Professor of Surgery, Indiana University School of Medicine. 2326 Fairfield Avenue, Fort Wayne, Ind.

1911.—Reder, Francis, M.D. Surgeon, St. Louis City and St. John's Hospitals. University Club Building, St. Louis, Mo.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary

Member of the Medical Society of the State of New York. 19 W. Seventh Street, Cincinnati, Ohio.

1914.—Rhodes, Goodrich Barbour, A.B., M.D. Associate Clinical Professor of Surgery, Medical College of the University of Cincinnati; Attending Surgeon, Cincinnati General Hospital and Episcopal Hospital for Children. The Ortiz, Fourth and Sycamore Streets, Cincinnati, Ohio.

1917.—Rhodes, Robert L., A.B., M.D. Associate in Surgery, Medical Department, University of Georgia; Visiting Surgeon, the Wilhenford Hospital; Assistant Visiting Surgeon, the University Hospital. 1103–5 Lamar Building, Augusta, Ga.

1919.—Richardson, Edward Henderson, A.B., M.D. Associate in Clinical Gynecology, Johns Hopkins University, Medical Department; Visiting Gynecologist, Union Protestant Infirmary, Church Home and Infirmary, Hebrew Hospital and Asylum, Bay View Hospital, Hospital for Women of Maryland; Assistant Visiting Gynecologist, Johns Hopkins Hospital. 1200 N. Charles St., Baltimore, Maryland.

1912.—Richardson, Edward P., M.D. Assistant Visiting Surgeon to the Massachusetts General Hospital. 224 Beacon Street, Boston, Mass.

1921.—Roberson, Foy, M.D. Surgeon to Watts Hospital; Surgeon to State Hospital for the Insane. First National Bank Building, Durham, N. C.

1901.—Robins, Charles Russell, M.D. Professor of Gynecology, Medical College of Virginia; Surgeon, Stuart Circle Hospital; Gynecologist, Memorial Hospital; formerly Chief Surgeon to the Virginia Hospital; President, Stuart Circle Hospital Corporation. *Vice-President*, 1920. 8 West Grace Street, Richmond, Va.

1917.—Robinson, Julian McG., M.D. 753 Main Street, Danville, Va.

1906.—Rogers, Carey Pegram, M.D. Chief of Surgical Staff, St. Luke's Hospital; Consulting Surgeon, Seaboard Air Line Railway. *Vice-President*, 1918. 221 Laura Street, Jacksonville, Florida.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Alabama.

1899.—Royster, Hubert Ashley, A.B., M.D. Surgeon to Rex Hospital; Surgeon-in-Chief, St. Agnes' Hospital; Surgeon to Southern Railway; Consulting Surgeon to the Sea-

board Air Line; Surgeon to the State Hospital for the Insane. *Vice-President,* 1907. *Secretary.* 423 Fayetteville Street, Raleigh, N. C.

1909.—Ruffin, Kirkland, M.D. Surgeon-in-Charge of St. Christopher's Hospital. 218 York Street, Norfolk, Va.

1921.—Sanders, R. L., M.D. Associate in Surgery, Memphis General Hospital; Visiting Surgeon, Baptist Memorial Hospital; Associate Professor of Surgery, University of Tennessee. Goodwyn Institute Building, Memphis, Tenn.

1893.—Saunders, Bacon, M.D. Professor of Surgery, Baylor School of Medicine, Dallas, Texas; ex-President, Texas State Medical Association; Chief Surgeon, Fort Worth and Denver City and Wichita Valley Railway Companies. *Vice-President,* 1903; *Member of Council,* 1908–1913. *President,* 1915. Flatiron Bldg., Fort Worth, Texas.

1907.—Scott, Arthur Carroll, M.D. Senior Surgeon, Temple Sanatorium. *Vice-President,* 1914. Temple, Texas.

1915.—Seelig, Major G., A.B., M.D. Professor of Surgery, Washington University School of Medicine; Attending Surgeon, Jewish Hospital; Chief of Surgical Out-Patient Department, Jewish Hospital. University Club Building, St. Louis, Mo.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of the George Washington University and in the University of Vermont; Orthopedic Surgeon to the George Washington University Hospital, the Emergency Hospital, and Central Dispensary; Charter Member, Washington Academy of Sciences; Member of American Orthopedic Association; and Honorary Member of Medical Society of Virginia. 901 Sixteenth Street, N. W., Washington, D. C.

1914.—Shands, Harley R., A.B., M.D. Visiting Surgeon, Mississippi State Charity and Baptist Hospitals. Century Building, Jackson, Miss.

1917.—Sherk, Henry H., M.D. Attending Surgeon, Pasadena Hospital; Surgeon, La Vina Sanitarium for the Tubercular. Central Building, Pasadena, Cal.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Consulting Surgeon to Louisville Hospital. *Vice-President,* 1911. Masonic Building, Louisville, Ky.

1900.—Simpson, Frank Farrow, M.D. Gynecologist to the Allegheny General Hospital. 7048 Jenkins Arcade Bldg., Pittsburgh, Pa.

1913.—Simpson, James Knox, M.D. Chief Surgeon, St. Luke's Hospital; Orthopedic Surgeon to Florida State Fund for Crippled Children. Jacksonville, Fla.

1920.—Singleton, Albert O., B.S., M.D. Associate Professor of Surgery, Medical Department, University of Texas, and Lecturer in Genito-urinary Diseases; Attending Surgeon to John Sealey Hospital. American National Insurance Building, Galveston, Texas.

1917.—Sistrunk, W. E., M.D. Mayo Clinic, Rochester, Minnesota.

1919.—Smyth, John, M.D. 724 Baronne St., New Orleans, Louisiana.

1899.—Smythe, Frank David, M.D. Gynecologist to St. Joseph's Hospital and President of the Staff; Lieut.-Col., Medical Corps, U. S. Army during the World War; ex-President, West Tennessee Medical and Surgical Society; formerly Member of the Board of Health and Examining Board of the State of Mississippi. 730–33 Exchange Building, Memphis, Tenn.

1916.—Souchon, Marion, M.D. Visiting Surgeon, Hotel Dieu; Surgeon, French Hospital; Assistant Professor of Clinical Surgery, Tulane University. Whitney Bank Bldg., New Orleans, La.

1904.—Stokes, James Ernest, M.D. *Vice-President*, 1917. Salisbury, N. C.

1918.—Stone, Harvey B., A.B., M.D. Instructor in Clinical Surgery, Johns Hopkins University; Assistant Visiting Surgeon, Johns Hopkins Hospital; Member of Staff, Union Memorial Hospital, Church Home and Infirmary, Mercy Hospital and Hebrew Hospital. 18 West Franklin Street, Baltimore, Md.

1920.—Sullivan, Raymond Peter, A.B., A.M., M.D. Surgeon to St. Vincent's and Holy Family (Brooklyn) Hospitals; Consulting Surgeon, King's Park Hospital, King's Park, N. Y. 270 Park Avenue, New York, N. Y.

1894.—Talley, Dyer F., A.M., M.D. Surgeon-in-Chief of Talley's Private Infirmary; Attending Surgeon to Hillman Hospital; ex-President of the Jefferson County Medical Society; Member of the Medical Association of the State of Alabama, of the Southern Medical Association, of the Alumni Association of the Charity Hospital of Louisiana, of the Board of Censors of the Jefferson County Medical Society, of the Board of Censors of the Committee of Health and Examining Board of the Medical Association of the State of Alabama; ex-Member of the Advisory

Board for Selective Draft; Fellow of the American College of Surgeons. 1808 Seventh Avenue, Birmingham, Alabama.

1921.—Taylor, Julius Heyward, M.D. Surgeon to the Baptist Hospital; Consulting Surgeon to the State Hospital for the Insane and to the Camden Hospital, Camden, S. C. Medical Building, Columbia, S. C.

1892.—Thompson, J. E., M.B., B.S. (London), F.R.C.S. (Eng.). Professor of Surgery in the University of Texas. *Vice-President*, 1912; *President*, 1919. Galveston, Tex.

1916.—Thorning, W. Burton, M.D. Chief Surgeon of the Gulf Coast Lines. Kress Building, Houston, Texas.

1908.—Torrance, Gaston, M.D. Member Surgical Staff Hillman Hospital; also the Sisters' Hospital and St. Vincent's; Fellow of the American Association of Obstetricians and Gynecologists. 328 Woodward Building, Birmingham, Ala.

1909.—Trout, Hugh Henry, M.D. Surgeon-in-Chief of Jefferson Hospital, Roanoke, Va. *Vice-President.* 1303 Franklin Road, Roanoke, Va.

1917.—Tupper, Paul Y., M.D. Clinical Professor of Surgery, Washington University Medical School; Visiting Surgeon St. Luke's Hospital; Consulting Surgeon, Missouri Baptist Sanitarium, Bethesda, Jewish and St. John's Hospitals, St. Louis Eye, Ear, Nose and Throat Infirmary. Wall Building, St. Louis, Mo.

1921.—Van Beuren, Frederick T., Jr., M.D. Associate Dean and Associate in Surgery, College of Physicians and Surgeons, Columbia University; Attending Surgeon, Sloane Hospital for Women. 437 West Fifty-ninth Street, New York, N. Y.

1909.—Vaughan, George Tully, M.D., LL.D. Professor of Surgery and Head of Department of Surgery in Georgetown University; Chief Surgeon in Georgetown University Hospital; Visiting Surgeon, Tuberculosis Hospital; Consulting Surgeon, St. Elizabeth's Hospital; Consulting Surgeon, Washington Asylum Hospital; Consulting Surgeon, U. S. Public Health Service; Commander, Medical Corps, Reserve Force, U. S. Navy. 1718 I Street, Washington, D. C.

1919.—Venable, Charles Scott, M.D. Attending Surgeon Lee Surgical Hospital, San Antonio, Texas; Attending Surgeon, Robert B. Green Memorial Hospital, San Antonio, Texas. Central Trust Building, San Antonia, Texas.

1912.—Walker, George, M.D. Associate in Surgery, Johns Hopkins University. 1 E. Centre St., Baltimore, Maryland.

1911.—Waring, T. P., M.D. Savannah, Ga.

1905.—Wathen, John R., A.B., M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Surgeon to St. Anthony's, and Louisville City Hospitals. 350 Francis Building, Louisville, Ky.

1907.—Watts, Stephen H., M.D. Professor of Surgery University of Virginia; Surgeon-in-Chief of the University of Virginia Hospital. University of Virginia, Charlottesville, Va.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. *Vice-President,* 1908. 241 Equitable Building, Atlanta, Ga.

1907.—Willis, A. Murat, M.D. Instructor in Abdominal Surgery, Medical College of Virginia; Junior Surgeon to Memorial Hospital, Richmond, Va. 405 East Grace Street, Richmond, Va.

1913.—Windell, James Tolbert, M.D. 715 West Jefferson Street, Louisville, Ky.

1921.—Winslow Nathan, M.D. Clinical Professor of Surgery in the University of Maryland; Visiting Surgeon to the University Hospital. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Winslow, Randolph, M.D., LL.D. Emeritus Professor of Surgery, University of Maryland. *President.* 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Formerly Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Member of American Association of Anatomists. Murray Hospital, Butte, Mont.

1900.—Young, Hugh H., M.D. Clinical Professor of Urology, Johns Hopkins University, Medical Department. Johns Hopkins Hospital, Baltimore, Md.

GEOGRAPHICAL LIST OF FELLOWS

ALABAMA

Baker, James Norment, 602 S. Perry St., Montgomery.
Cole, Herbert Phalon, Van Antwerp Bldg., Mobile.
Du Bose, Francis Goodwin, Selma.
Heflin, Wyatt, 3216 Cliff Road, Birmingham.
Hill, Robert Somerville, Montgomery.
Hogan, Edgar P., 412–14 Empire Bldg., Birmingham.
Jackson, William R., 164 St. Michael St., Mobile.
Jordan, William Mudd, 915 Empire Bldg., Birmingham.
Ledbetter, Samuel L., Jr., 516 Empire Bldg., Birmingham.
Lupton, Frank A., 816 Woodward Bldg., Birmingham.
McAdory, Wellington P., Birmingham.
Mason, J. M., 1915 Sixteenth Ave., S., Birmingham.
Mastin, William M., Joachim and Conti Sts., Mobile.
Morris, Lewis C., 1203–7 Empire Bldg., Birmingham.
Noland, Lloyd, Employees' Hospital, Birmingham.
Rogers, Mack, 212 Twentieth St., Birmingham.
Talley, Dyer F., 1801 Seventh Ave., Birmingham.
Torrance, Gaston, 328 Woodward Bldg., Birmingham.

CALIFORNIA

Gilcreest, Edgar L., 3698 California St., San Francisco.
Sherk, Henry H., Central Building, Pasadena.

FLORIDA

Helms, John Sullivan, Tampa.
Holden, Gerry R., 513 Laura St., Jacksonville.
Rogers, Carey Pegram, 221 Laura St., Jacksonville.
Simpson, James Knox, Jacksonville.

GEORGIA

Boland, Frank K., Candler Bldg., Atlanta.
Dowman, Charles E., 78 Forrest Ave., Atlanta.
Doughty, W. H., 822 Greene St., Augusta.
Earnest, John G., 828 Candler Bldg., Atlanta.

ELKIN, WILLIAM SIMPSON, 1029 Candler Bldg., Atlanta.
GOLDSMITH, W. S., 262 Jackson St., Atlanta.
HODGSON, FRED. G., 746 Peachtree St., Atlanta.
NICOLSON, WILLIAM PERRIN, Healy Bldg, Atlanta.
NOBLE, GEORGE H., 186 S. Pryor St., Atlanta.
RHODES, ROBERT L., 1103–5 Lamar Bldg., Augusta.
WARING, T. P., Savannah.
WESTMORELAND, WILLIS F., 241 Equitable Bldg., Atlanta.

ILLINOIS

LEWIS, DEAN, 122 S. Michigan Ave., Chicago.
MARTIN, FRANKLIN H., 30 North Michigan Ave., Chicago.
OCHSNER, A. J., 2106 Sedgwick Street, Chicago.
OCHSNER, EDWARD H., 2155 Cleveland Ave., Chicago.

INDIANA

PORTER, MILES F., 2326 Fairfield Ave., Fort Wayne.

KENTUCKY

ABELL, IRVIN, 700 Francis Bldg., Louisville.
BARROW, DAVID, 148 Market St., Lexington.
FRANK, LOUIS, 400 Atherton Bldg., Louisville.
HANES, GRANVILLE S., Francis Bldg., Louisville.
HENDON, GEORGE A., 646 Francis Bldg., Louisville.
SHERRILL, J. GARLAND, Masonic Bldg., Louisville.
WATHEN, JOHN R., 350 Francis Bldg., Louisville.
WINDELL, JAMES T., 715 West Jefferson St., Louisville.

LOUISIANA

ALLEN, CARROLL W., 43 Audubon Boulevard, New Orleans.
CLARK, S. M. D., 1435 Harmony St., New Orleans.
COCRAM, HENRY S., 108 Baronne St., New Orleans.
DANNA, JOSEPH A., Charity Hospital, New Orleans.
GESSNER, HERMAN B., 1105 Maison Blanche Bldg., New Orleans.
LANDRY, LUCIAN H., 2255 St. Charles Ave., New Orleans.
MAES, URBAN, 1671 Octavia St., New Orleans.
MARTIN, E. DENEGRE, 3513 Prytania St., New Orleans.
MATAS, RUDOLPH, 3523 Prytania St., New Orleans.

Miller, C. Jeff, 1638 Joseph St., New Orleans.
Parham, F. W., 1429 Seventh St., New Orleans.
Smyth, John, 724 Baronne St., New Orleans.
Souchon, Marion, Whitney Bank Bldg., New Orleans.

MAINE

Cousins, William Lewis, 231 Woodford St., Portland.

MARYLAND

Baer, William S., 4 E. Madison St., Baltimore.
Bagley, Charles, Jr., The Latrobe, Baltimore.
Bloodgood, Joseph C., 904 N. Charles St., Baltimore.
Burnam, Curtis Field, 1418 Eutaw Place, Baltimore.
Cullen, Thomas Stephen, 20 E. Eager St., Baltimore.
Davis, John Staige, The Severn, Baltimore.
Fisher, Wm. A., Jr., 715 Park Ave., Baltimore.
Finney, J. M. T., 1300 Eutaw Place, Baltimore.
Hunner, Guy LeRoy, 2305 St. Paul St., Baltimore.
Kelly, Howard Atwood, 1418 Eutaw Place, Baltimore.
McGlannan, Alexius, 115 W. Franklin St., Baltimore.
Platt, Walter Brewster, 802 Cathedral St., Baltimore.
Richardson, Edward H., 1200 N. Charles St., Baltimore.
Stone, Harvey B., 18 West Franklin St., Baltimore.
Walker, George, 1 E. Centre St., Baltimore.
Winslow, Nathan, 1900 Mount Royal Terrace, Baltimore.
Winslow, Randolph, 1900 Mount Royal Terrace, Baltimore.
Young, Hugh H., Johns Hopkins Hospital, Baltimore.

MASSACHUSETTS

Marcy, Henry Orlando, 180 Commonwealth Ave., Boston.
Mixter, Charles G., 180 Marlborough St., Boston.
Mixter, Samuel Jason, 180 Marlborough St., Boston.
Richardson, Edward P., 224 Beacon St., Boston.

MICHIGAN

Cullen, Ernest K., David Whitney Bldg., Detroit.
Peterson, Reuben, Ann Arbor.

MINNESOTA

Balfour, Donald Church, Rochester.
Judd, Edward Starr, Rochester.
Law, Arthur Ayer, Syndicate Bldg., Minneapolis.
Mayo, Charles H., Rochester.
Pemberton, John de J., Rochester.
Sistrunk, W. E., Rochester.

MISSISSIPPI

Barksdale, John W., Winona.
Crawford, Walter W., Hattiesburg.
Shands, Harley R., Century Bldg., Jackson.

MISSOURI

Allison, Nathaniel, 608 Humboldt Bldg., St. Louis.
Bailey, Fred W., 611 Metropolitan Bldg., St. Louis.
Bartlett, Willard, 410 Metropolitan Bldg., St. Louis.
Blair, Vilray Papin, Metropolitan Bldg., St. Louis.
Clopton, Malvern B., Humboldt Building, St. Louis, Mo.
Elbrecht, O. H., 423 Metropolitan Bldg., St. Louis.
Jonas, Ernst, 4495 Westminster Place, St. Louis.
Kirchner, Walter C. G., 508 N. Grand Ave., St. Louis.
Lewis, Bransford, Century Bldg., St. Louis.
Reder, Francis, University Club Bldg., St. Louis.
Seelig, Major G., University Club Bldg., St. Louis.
Tupper, Paul Y., Wall Bldg., St. Louis.

MONTANA

Witherspoon, T. Casey, Murray Hospital, Butte.

NEW JERSEY

Ill, Edward Joseph, 1002 Broad St., Newark.

NEW YORK

Boldt, Herman J., 616 Madison Ave., New York City.
Coley, William B., 6 West 50th St., New York City.
Downes, William Augustus, 424 Park Ave., New York City.

Gerster, John C. A., 18 E. 78th St., New York City.
Lloyd, Samuel, 50 E. 42d St., New York City.
Morris, Robert Tuttle, 616 Madison Ave., New York City.
Peck, Charles H., 30 W. 50th St., New York City.
Pool, Eugene H., 107 E. 60th St., New York City.
Sullivan, R. P., 270 Park Ave., New York City.
Van Beuren, Frederick T. Jr., 437 W. 59th St., New York City.

NORTH CAROLINA

Biggs, Montgomery Herman, Rutherfordton.
Fletcher, Marshall H., 199 Haywood St., Asheville.
Gibbon, Robert L., Charlotte.
Norris, Henry, Rutherfordton.
Roberson, Foy, First National Bank Bldg., Durham.
Royster, Hubert Ashley, 423 Fayetteville St., Raleigh.
Stokes, James Ernest, Salisbury.

OHIO

Bonifield, Charles Lybrand, 409 Broadway, Cincinnati.
Caldwell, C. E., The Livingston, 7th and Race Sts., Cincinnati.
Carothers, Robert, 409 Broadway, Cincinnati.
Crile, George W., 1021 Prospect Ave., Cleveland.
Hall, Rufus Bartlett, 628 Elm St., Cincinnati.
Lower, William E., Euclid Ave., at 93d St., Cleveland.
Oliver, John Chadwick, 628 Elm St., Cincinnati.
Reed, Charles Alfred Lee, 19 W. 7th St., Cincinnati.
Rhodes, Goodrich Barbour, The Ortiz, 4th and Sycamore St., Cincinnati.

OREGON

Coffey, Robert C., Stevens Building, Portland.

PENNSYLVANIA

Clark, John G., 2017 Walnut St., Philadelphia.
Deaver, John B., 1634 Walnut St., Philadelphia.
Frazier, Charles H., 1724 Spruce St., Philadelphia.
Gibbon, John H., 1608 Spruce St., Philadelphia.
Miller, Robert Talbott, Jr., Diamond Bank Bldg., Pittsburgh.
Simpson, Frank Farrow, 7048 Jenkins Arcade Bldg., Pittsburgh.

SOUTH CAROLINA

Buist, A. Johnston, 279 Meeting Street, Charleston.
Cathcart, R. S., 75 Hasell St., Charleston.
Guerry, Le Grand, Columbia.
Taylor, Julius H., Medical Bldg., Columbia.

TENNESSEE

Barr, Richard Alexander, 800 Nineteenth Ave., S., Nashville.
Black, William T., Exchange Bldg., Memphis.
Bryan, W. A., 146 Eighth Ave., N., Nashville.
Burch, Lucius E., 210 Doctors' Bldg., Nashville.
Caldwell, Robert, 510 Jackson Bldg., Nashville.
Cowden, Charles N., Hitchcock Bldg., Nashville.
Crisler, Joseph Augustus, Exchange Bldg., Memphis.
Crook, Jere L., 110 W. Baltimore St., Jackson.
Dixon, W. C., 216 Doctors' Bldg., Nashville.
Haggard, William David, 706 Church St., Nashville.
Malone, Battle, 624 Exchange Bldg., Memphis.
Maury, John M., Bank of Commerce Bldg., Memphis.
Newell, E. Dunbar, Chattanooga.
Sanders, R. L., Goodwyn Institute Bldg., Memphis.
Smythe, Frank David, 730–33 Exchange Bldg., Memphis.

TEXAS

Beall, Frank C., 703 Lamar St., Fort Worth.
Moore, John Thomas, Kress Bldg., Houston.
Saunders, Bacon, Flatiron Bldg., Fort Worth.
Scott, Arthur Carroll, Temple.
Singleton, Albert O., American National Insurance Bldg., Galveston.
Thompson, J. E., Galveston.
Thorning, W. Burton, Kress Bldg., Houston.
Venable, Charles S., Central Trust Building, San Antonio.

VIRGINIA

Baughman, Greer, 26 N. Laurel St., Richmond.
Bell, Richard Phillips, 202 Professional Bldg., Staunton.
Bryan, Robert C., Grace Hospital, Richmond.
Coleman, Claude C., 503 Professional Bldg., Richmond.

Gwathmey, Lomax, Norfolk.
Henson, J. W., 405 N. Allen St., Richmond.
Horsley, John Shelton, 617 W. Grace St., Richmond.
La Roque, G. Paul, 603 East Grace St., Richmond.
Leigh, Southgate, 109 College Place, Norfolk.
McGuire, Stuart, 513 E. Grace St., Richmond.
MacLean, Henry Stuart, 401 W. Grace St., Richmond.
Miller, Edward Howe, Jr., 6 Chestnut Place, Danville.
Payne, Robert Lee, Tazewell Bldg., Norfolk.
Peple, W. Lowndes, 1209 W. Franklin St., Richmond.
Robins, Charles Russell, 8 W. Grace St., Richmond.
Robinson, Julian McG., 753 Main St., Danville.
Ruffin, Kirkland, 218 York St., Norfolk.
Trout, Hugh Henry, 1303 Franklin Road, Roanoke.
Watts, Stephen H., Charlottesville.
Willis, A. Murat, 405 E. Grace St., Richmond.

WEST VIRGINIA

Cannaday, John Egerton, Kanowha Banking and Trust Co. Bldg., Charleston.
Hupp, Frank Le Moyne, 61 Fourteenth St., Wheeling.

WASHINGTON, D. C.

Bovée, J. Wesley, The Rochambeau.
Carr, William P., 1801 K. St., N. W.
Hagner, Francis Randall, The Farragut.
Kerr, Harry Hyland, 1742 N Street, N. W.
Mitchell, James F., 1344 Nineteenth St.
Moran, John F., 2426 Pennsylvania Ave.
Shands, A. R., 901 Sixteenth Street, N. W.
Vaughan, George Tully, 1718 I St.

CONSTITUTION

ARTICLE I

The name of this Association shall be THE SOUTHERN SURGICAL ASSOCIATION.

ARTICLE II

The object of this Association shall be to further the study and practice of Surgery in its various departments, especially among the profession of the Southern States.

ARTICLE III

SECTION 1. The qualifications which must be possessed by an applicant for fellowship in the Association shall be: (*a*) Good standing in his State Association; (*b*) experience covering not less than ten years of professional work; (*c*) practice limited essentially to surgery or one of its specialties; (*d*) recommendation by three Fellows, two preferably from his own State.

SECTION 2. Application for Fellowship shall be filed with the Secretary on the blank form provided for that purpose. The Council at each annual session shall carefully consider all candidates and may nominate one for each vacancy that exists on the roll for election or rejection by the Association.

ARTICLE IV

The Honorary Fellows of the Association shall not exceed twenty-five in number. They shall be nominated by the Council and elected by the Association. They will not be required to pay any dues and shall enjoy all the privileges of other Fellows except that of voting or holding office; this exception does not apply to Founders.

ARTICLE V

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

SEC. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for reëlection at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its Fellows to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its Fellows; to keep a register of the Fellows, with the dates of their admission and places of residence. He shall collect all moneys due from the Fellows and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

SEC. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three Fellows of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX

The Fellowship of the Association shall be limited to two hundred.

BY-LAWS

ARTICLE I

The Southern Surgical Association shall meet annually on the Tuesday of the week preceding the week in which Christmas occurs, at 10 A.M., at such place as may be designated at the preceding meeting.

ARTICLE II

The Fellows present shall constitute a quorum for business.

ARTICLE III

The annual dues of each Fellow shall be $15, paid in advance.

ARTICLE IV

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII

The Secretary of the Association shall receive at each annual Session a draft from the President, drawn on the Treasurer, for such sum as may be voted him by the Council, for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the Fellows of the Association and urge their attendance.

ARTICLE IX

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X

COUNCIL

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, and the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. No member of the Council shall be eligible for reëlection. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided*, that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII

The Council shall have power to drop from the roll of Fellows any member who fails to pay his dues for more than one year, or misses three consecutive sessions of the Association, or who for any reason fails to retain his good standing in his State association.

ARTICLE XIV

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV

No paper read before this Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the endorsement of the Council.

ARTICLE XVI

The readings of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

OF THE

THIRTY-FOURTH ANNUAL MEETING

OF THE

SOUTHERN SURGICAL ASSOCIATION

HELD AT THE

CAROLINA HOTEL

Pinehurst, North Carolina

DECEMBER 13, 14 AND 15, 1921

THIRTY-FOURTH ANNUAL MEETING

FIRST DAY, *Tuesday, December* 13, 1921

The following named Fellows were present:

BAER, WILLIAM S.	Baltimore, Md.
BAKER, JAMES N.	Montgomery, Ala.
BARR, RICHARD A.	Nashville, Tenn.
BARTLETT, WILLARD	St. Louis, Mo.
BIGGS, MONTGOMERY H.	Rutherfordton, N. C.
BLACK, WILLIAM T.	Memphis, Tenn.
BLAIR, VILRAY P.	St. Louis, Mo.
BLOODGOOD, JOSEPH C.	Baltimore, Md.
BOLAND, FRANK K.	Atlanta, Ga.
BOLDT, HERMANN J.	New York City.
BOVÉE, J. WESLEY	Washington, D. C.
BRYAN, ROBERT C.	Richmond, Va.
BRYAN, W. A.	Nashville, Tenn.
BUIST, A. JOHNSTON	Charleston, S. C.
BURCH, LUCIUS E.	Nashville, Tenn.
BURNAM, CURTIS F.	Baltimore, Md.
CALDWELL, ROBERT	Nashville, Tenn.
CANNADAY, JOHN E.	Charleston, West Va.
CATHCART, R. S.	Charleston, S. C.
COLE, HERBERT P.	Mobile, Ala.
COLEMAN, CLAUDE C.	Richmond, Va.
CRILE, GEORGE W.	Cleveland, O.
CRISLER, JOSEPH A.	Memphis, Tenn.
CROOK, JERE L.	Jackson, Tenn.
CULLEN, THOMAS S.	Baltimore, Md.
DANNA, JOSEPH A.	New Orleans, La.
DOWNES, WILLIAM A.	New York City.
DU BOSE, FRANCIS G.	Selma, Ala.
ELKIN, WILLIAM S.	Atlanta, Ga.

FINNEY, J. M. T. ..... Baltimore, Md.
FRAZIER, CHARLES H. ..... Philadelphia, Pa.
GIBBON, JOHN H. ..... Philadelphia, Pa.
GIBBON, R. L. ..... Charlotte, N. C.
GOLDSMITH, W. S. ..... Atlanta, Ga.
GUERRY, LE GRAND ..... Columbia, S. C.
GWATHMEY, LOMAX ..... Norfolk, Va.
HAGGARD, WILLIAM D. ..... Nashville, Tenn.
HAGNER, FRANCIS R. ..... Washington, D. C.
HALL, RUFUS B. ..... Cincinnati, O.
HELMS, JOHN S. ..... Tampa, Fla.
HILL, ROBERT S. ..... Montgomery, Ala.
HOGAN, EDGAR P. ..... Birmingham, Ala.
HORSLEY, J. SHELTON ..... Richmond, Va.
HUNNER, GUY L. ..... Baltimore, Md.
ILL, EDWARD J. ..... Newark, N. J.
JACKSON, WILLIAM R. ..... Mobile, Ala.
JONAS, ERNST ..... St. Louis, Mo.
JUDD, EDWARD S. ..... Rochester, Minn.
KELLY, HOWARD A. ..... Baltimore, Md.
KERR, HARRY H. ..... Washington, D. C.
LA ROQUE, G. PAUL ..... Richmond, Va.
LAW, ARTHUR A. ..... Minneapolis, Minn.
LEIGH, SOUTHGATE ..... Norfolk, Va..
LEWIS, DEAN ..... Chicago, Ill.
MCGLANNAN, ALEXIUS ..... Baltimore, Md.
MCGUIRE, STUART ..... Richmond, Va.
MACLEAN, HENRY S. ..... Richmond, Va.
MALONE, BATTLE ..... Memphis, Tenn.
MARCY, HENRY O. ..... Boston, Mass.
MARTIN, FRANKLIN H. ..... Chicago, Ill.
MASON, J. M. ..... Birmingham, Ala.
MAURY, JOHN M. ..... Memphis, Tenn.
MAYO, CHARLES H. ..... Rochester, Minn.
MILLER, C. JEFF ..... New Orleans, La.
MILLER, EDWARD H. ..... Danville, Va.
MILLER, ROBERT T. ..... Pittsburgh, Pa.
MIXTER, SAMUEL J. ..... Boston, Mass.
MORAN, JOHN F. ..... Washington, D. C.
MORRIS, ROBERT T. ..... New York City.
NEWELL, E. DUNBAR ..... Chattanooga, Tenn.
NICOLSON, WILLIAM P. ..... Atlanta, Ga.

NOLAND, LLOYD.....Birmingham, Ala.
NORRIS, HENRY.....Rutherfordton, N. C.
OCHSNER, EDWARD H.....Chicago, Ill.
PARHAM, F. W.....New Orleans, La.
PAYNE, ROBERT L.....Norfolk, Va.
PECK, CHARLES H.....New York City.
PEPLE, W. LOWNDES.....Richmond, Va.
RHODES, ROBERT L.....Augusta, Ga.
RICHARDSON, EDWARD H.....Baltimore, Md.
ROBINS, CHARLES R.....Richmond, Va.
ROBINSON, JULIAN McG.....Danville, Va.
ROYSTER, HUBERT A.....Raleigh, N. C.
SAUNDERS, BACON.....Fort Worth, Texas.
SCOTT, ARTHUR C.....Temple, Texas.
SHANDS, A. R.....Washington, D. C.
SHERK, HENRY H.....Pasadena, Cal.
SIMPSON, JAMES K.....Jacksonville, Fla.
SMYTHE, FRANK D.....Memphis, Tenn.
STOKES, JAMES E.....Salisbury, N. C.
STONE, HARVEY B.....Baltimore, Md.
SULLIVAN, RAYMOND P.....New York City.
TALLEY, DYER F.....Birmingham, Ala.
THOMPSON, J. E.....Galveston, Texas.
TORRANCE, GASTON.....Birmingham, Ala.
TROUT, HUGH H.....Roanoke, Va.
TUPPER, PAUL Y.....St. Louis, Mo.
VAUGHAN, GEORGE T.....Washington, D. C.
WARING, T. P.....Savannah, Ga.
WATHEN, JOHN R.....Louisville, Ky.
WATTS, STEPHEN H.....Charlottesville, Va.
WILLIS, A. MURAT.....Richmond, Va.
WINSLOW, RANDOLPH.....Baltimore, Md.

The following Honorary Fellows were present:

LONG, JOHN WESLEY.....Greensboro, N. C.
STONE, ISAAC S.....Washington, D. C.

Letters and messages of regret were received from the following Fellows who were unable to attend the meeting: D. C. Balfour, Denver, Colorado; Robert Carothers, Cincinnati, Ohio; John G. Clark, Philadelphia; S. M. D. Clark, New Orleans; William B. Coley, New York City; Ernest K. Cullen, Detroit,

Michigan; William A. Fisher, Baltimore, Maryland; Louis Frank, Louisville, Kentucky; W. C. G. Kirchner, St. Louis, Missouri; Urban Maes, New Orleans; George H. Noble, Atlanta, Georgia; Reuben Peterson, Ann Arbor, Michigan; Eugene H. Pool, New York City; Francis Reder, St. Louis; E. P. Richardson, Boston, Massachusetts; H. R. Shands, Jackson, Mississippi; J. Garland Sherrill, Louisville, Kentucky; John Staige Davis, Baltimore; W. H. Doughty, Augusta, Georgia; S. L. Ledbetter, Birmingham, Alabama; Gerry R. Holden, Jacksonville, Florida; Charles Bagley, Baltimore; W. Burton Thorning, Houston, Texas; John T. Moore, Houston, Texas; Rudolph Matas, New Orleans.

On motion of the Secretary, visiting physicians and surgeons were extended the courtesies and privileges of the floor.

Morning Session. The Association met in the Assembly Hall of the Carolina Hotel, and was called to order at 10 A.M. by the Secretary, Dr. Royster, who introduced the Chairman of the Committee of Arrangements, Dr. Robert L. Gibbon, of Charlotte, who said: The Fellows of the Association from North Carolina are much pleased to have you with us. We have endeavored to make the arrangements comfortable and pleasant for you, and we hope you will enjoy the meeting. This afternoon we will have a golf tournament and a shooting exhibition. Wednesday evening the annual dinner of the Association will be held in this hotel.

The Secretary then introduced the President, Dr. Randolph Winslow, Baltimore, Maryland, who, on taking the chair, cordially welcomed the Fellows of the Association, and said that judging from the program and the titles of papers the meeting would be a profitable and pleasant one both socially and scientifically.

Papers were read as follows:

1. "The Treatment of Extensive Basal Celled Cancer," by Dr. J. Shelton Horsley, Richmond, Virginia.

2. "Treatment of Cancer of the Tongue," by Dr. Curtis F. Burnam, Baltimore, Maryland.

3. "Primary Carcinoma of the Female Bladder," by Dr. Isaac S. Stone, Washington, D. C.

These three papers were discussed together by Drs. Marcy, Finney, Haggard, Hagner, Boldt and J. H. Gibbon, after which the discussion was closed by the essayists.

4. "Two Cases of Periosteal Sarcoma in Association with

Osteomyelitis," by Dr. Robert L. Rhodes, Augusta, Georgia, which was discussed by Dr. Ochsner.

5. "A Consideration of Some Nontubercular Kidney Infections," by Dr. R. P. Sullivan, of New York City, N. Y.

6. "Ureteral Stricture an Important Factor in So-called Idiopathic or Essential Hematuria," by Dr. Guy L. Hunner, Baltimore, Maryland.

7. "Recurrence of the Benign Prostate," by Dr. W. A. Bryan, Nashville, Tennessee.

These three papers were discussed together by Drs. Baker, Boldt, Hagner, Marcy, Mayo, and in closing by Drs. Bryan and Hunner.

8. "Some Further Umbilical Cases," by Dr. Thomas S. Cullen, Baltimore, Maryland. Discussed by Dr. Marcy.

On motion the Association adjourned until 7.30 P.M.

NOTE.—No afternoon session was held, the time being devoted to golf, riding, shooting, etc.

Evening Session. The Association reconvened at 8 P.M., and was called to order by the President.

9. "The Value of Mensuration in Harelip Operations," by Dr. James E. Thompson, Galveston, Texas.

10. "The Use of the Bone Graft in the Treatment of Tuberculosis of the Spine, or Pott's Disease," by William S. Baer, Baltimore, Maryland.

11. "Plastic Operations upon the Peripheral Nerves," by Dr. Dean D. Lewis, Chicago, Illinois.

12. "The Surgical Treatment of Facial Paralysis," by Dr. C. C. Coleman, Richmond, Virginia.

13. "The Present Status of Epiplopexy," by Dr. John H. Gibbon, Philadelphia, Pennsylvania.

14. "Notes Relating to Enteroptosis," by Dr. Robert T. Morris, New York City.

15. "Reconstruction of the Female Urethra and Vesical Sphincter," by Dr. E. H. Richardson, Baltimore, Maryland.

All of these papers were discussed together by Drs. Watts, Ochsner, Kerr, Morris, Law, Bryan, Mixter, Cole and Payne, after which the discussion was closed by Drs. Thompson, Baer, Lewis and Coleman.

On motion the Association adjourned until 9 A.M., Wednesday December 14.

SECOND DAY—*Wednesday, December* 14, 1921

Morning Session. The Association met at 9.30 A.M., and was called to order by the President.

The President appointed as a committee to audit the books of the Treasurer, Drs. C. R. Robins, E. D. Newell and John R. Wathen.

16. "Special Points in the Surgery of the Stomach," by Dr. George W. Crile, Cleveland, Ohio.

17. "Bleeding Ulcer of the Duodenum with Associated Infection in the Gall-bladder," by Dr. Edward S. Judd, Rochester, Minnesota.

18. "On the Choice of Operations for Duodenal Ulcer," by Dr. Le Grand Guerry, Columbia, South Carolina.

19. "Gastrojejunalcolic Fistula and its Treatment," by Dr. Charles H. Mayo, Rochester, Minnesota.

These papers were discussed together by Drs. Marcy, Downes, Finney, Rhodes, Horsley, J. H. Gibbon, Peck, Barr, Robins, and in closing by Drs. Crile, Judd, Guerry and Mayo.

20. "Duodenal Diverticula," by Dr. William A. Downes, New York City.

21. "Meckel's Diverticulum," by Dr. Alexius McGlannan, Baltimore, Maryland.

These two papers were discussed together by Drs. Cullen, Thompson, Lewis, Nicolson, Black, Winslow, Parham, Jonas, Crisler, Smythe, Boldt, and in closing by the essayists.

22. "Contracture of the Psoas Parvus as an Explanation of Obscure Abdominal Pain in Certain Cases," by Dr. Lloyd Noland, Birmingham, Alabama. Discussed by Drs. Mason, Crowell (by invitation), Baer, and in closing by the essayist.

23. "Ideal Cholecystotomy, a Valuable Procedure in Certain Cases of Cholelithiasis," by Dr. A. Murat Willis, Richmond, Virginia. Discussed by Drs. Horsley, Jonas, Cannaday, Marcy, Winslow, Morris, Judd, Hogan, Long, and in closing by the author of the paper.

On motion the Association adjourned until 2 P.M.

Afternoon Session. The Association reconvened at 2.30 P.M., and was called to order by the President.

24. "Aneurysm of the Extracranial Portion of the Internal Carotid Artery," by Dr. Nathan Winslow, Baltimore, Maryland. (By invitation.)

25. "The Straight Vessels of the Terminal Ileum," by Dr. Robert L. Payne, Norfolk, Virginia.

26. "Occlusions of the Mesenteric Vessels," by Dr. James M. Mason, Birmingham, Alabama.

27. "Report of Another Case of Septic Thrombosis of the Femoral Vein," by Dr. D. F. Talley, Birmingham, Alabama.

28. "Another Case of Bullet Wound of the Femoral Artery and Vein Successfully Treated by Ligation of the Artery and Vein and Extirpation of the Injured Segment," by Dr. G. Paul La Roque, Richmond, Virginia.

29. "The Ligation of the Internal Iliac Artery for Enormous Aneurysm of the Gluteal Artery; Cirsoid Aneurysm of the Scalp," by Dr. William D. Haggard, Nashville, Tennessee.

These papers were discussed together by Drs. Cullen, Buist, Du Bose, Thompson, Crook, Judd, Danna, Long, Parham, and in closing by Drs. Mason, Haggard and La Roque.

30. "Reconstruction of the Nose," by Dr. V. P. Blair, St. Louis Missouri.

Discussed by Drs. Mixter, Thompson, Coleman, and in closing by the essayist.

31. "The Last Word on Hernia," by Dr. Henry O. Marcy, Boston, Massachusetts.

Discussed by Drs. Danna, Mason, Long, and in closing by the essayist.

On motion the Association adjourned until 9.30 A.M., Thursday, December 15.

32. At the Association dinner the President, Dr. Randolph Winslow, delivered his address. He selected for his subject, "Retrospect and Prospect."

THIRD DAY.—*Thursday, December* 15, 1921

Morning Session. The Association met at 9.30 A.M., and was called to order by the President.

33. "Operation for Diaphragmatic Hernia," by Dr. Harvey B. Stone, Baltimore, Maryland.

34. "Hernia of the Bladder, with Report of a Case," by Dr. James N. Baker, Montgomery, Alabama.

These two papers were discussed together by Drs. Mason, Jonas, Hagner, Cole, Simpson, Stone, Miller, Truesdale, Burch, Scott, Winslow, Long, and discussion closed by the authors of the papers.

35. "Final Results in a Series of Cases of Fibroids of the Uterus and Uterine Hemorrhage from Other Causes Treated by Radium," by Dr. C. Jeff Miller, New Orleans, Louisiana.

36. "Conservative Surgery in Nonmalignant Diseases of the Pelvic Organs," by Dr. E. P. Hogan, Birmingham, Alabama.

These two papers were discussed by Drs. Kelly, Hill, Du Bose, Boldt, Hunner and Robins, after which the discussion was closed by the essayists.

Dr. Robins, in reporting for the Auditing Committee, stated that the committee had carefully examined the accounts of the Treasurer and had found them correct, and had so certified.

It was moved that the report of the Auditing Committee be accepted. Seconded and carried. The Secretary presented the report of the Council as follows:

Report of the Council

The Council begs leave to present the following report:

1. The names of Drs. A. C. Scott, Temple, Texas; J. E. Stokes, Salisbury, North Carolina, and George A. Hendon, Louisville, Kentucky, are proposed for membership on the Board of Governors of the American College of Surgeons.

2. It is recommended that the Association adopt the following resolution:

Whereas, The late Major General William C. Gorgas has contributed immeasurably to the science of humanity in the interpretation and prevention of the great tropical scourges, no less than by his superlative service for the health and lives of American arms in the great World War; and

Whereas, It has been made known to us that the Gorgas Memorial Institute proposes the erection and perpetuation of a great laboratory and Institute of Research in the Republic of Panama for the further study and eradication of tropical diseases and for the preparation and maintenance of expeditions to be sent to all places of pestilence throughout the world, when necessary, to study and conquer all forms of infectious diseases, and that such a beneficent institution is to occupy a fitting home to be builded by the munificence of the Republic of Panama and sustained by the income from a Foundation of at least three million dollars to be donated by the patriotic and generous citizenry of both American continents; therefore be it

Resolved, That the Southern Surgical Association, at its thirty-fourth annual session, held at Pinehurst, North Carolina, on December 13, 14 and 15, 1921, does hereby most cordially endorse the contemplated memorial to the late Major-General William C. Gorgas, himself the highest exponent of Southern gentility and chivalry, as a tribute to his imperishable achievement and a perpetual arm for the continuation of his scientific spirit for medical research; and be it further

Resolved, That a committee of three Fellows be empowered to join in all laudable efforts for the realization of the Gorgas Memorial Institute.

THE PRESIDENT: I think it would be well to vote on this resolution separately.

It was moved and seconded that the resolutions be adopted. Carried.

3. A senior fellowship list is proposed, as set forth in the accompanying amendment to the Constitution: Any Fellow who has held fellowship for twenty years or more may become a Senior Fellow upon application to and recommendation by the Council and election by the Association. Senior Fellows will be exempt from the payment of dues, but shall not have the privilege of voting or of holding office.

4. The following Fellows were dropped from the roster on account of nonattendance: Drs. R. E. Fort, Nashville, Tennessee; A. H. Freiburg, Cincinnati, Ohio; C. M. Rosser, Dallas, Texas.

5. The resignations of two Fellows were accepted: Drs. R. C. Turck, Jacksonville, Florida, and E. Gustav Zinke, Cincinnati, Ohio.

6. The deaths of two Honorary Fellows, Drs. R. M. Cunningham, Ensley, Alabama, and Joseph Tabor Johnson, Cherrydale, Virginia, and of the following Fellows have occurred during the year, and suitable memorials of them are ordered to be prepared for the *Transactions:* Drs. H. H. Grant, Louisville, Kentucky; E. G. Jones, Atlanta, Georgia; F. W. McRae, Atlanta, Georgia; W. M. Perkins, New Orleans, Louisiana; Joseph Ransohoff, Cincinnati, Ohio; W. O. Roberts, Louisville, Kentucky; W. Edward McGuire, Richmond, Virginia, and William Kohlman, New Orleans, Louisiana.

7. The following names were suggested to fill vacancies in the list of Fellows:

Charles G. Mixter, Boston, Mass.; John de J. Pemberton,

Rochester, Minn.; F. T. Van Beuren, Jr., New York City; William E. Lower, Cleveland, O.; Charles E. Dowman, Atlanta, Ga.; Nathan Winslow, Baltimore, Md.; Frank Le Moyne Hupp, Wheeling, West Va.; Nathaniel Allison, St. Louis, Mo.; Foy Roberson, Durham, N. C.; William C. Dixon, Nashville, Tenn.; Julius H. Taylor, Columbia, S. C.; Robert L. Sanders, Memphis, Tenn.

8. It is recommended that the next meeting be held at Memphis, Tennessee, and that Dr. Battle Malone be chosen as Chairman of the Committee of Arrangements.

9. The officers nominated for the ensuing year are as follows: President, Dr. C. Jeff Miller, New Orleans, Louisiana; Vice-Presidents, Dr. V. P. Blair, St. Louis, Missouri, and Dr. R. L. Gibbon, Charlotte, North Carolina; Member of Council, Dr. Randolph Winslow, Baltimore, Maryland.

Respectfully submitted,

T. S. Cullen,
William D. Haggard,
I. S. Stone,
J. E. Thompson,
Willard Bartlett,
The Council.

The President: You have heard the report of the Council as read by the Secretary. What is your pleasure with it?

Dr. Herman N. J. Boldt: I move that it be adopted as a whole. Seconded and carried.

The President appointed Drs. F. W. Parham and Howard A. Kelly a committee to escort the newly elected President to the platform. In introducing his successor, Dr. Winslow said: Gentlemen, your President, Dr. Miller.

Dr. Miller in accepting the presidency said: I feel that Dr. Winslow made an error in selecting two to bring me to the platform; he should have appointed four and a stretcher. That is the way I feel at this moment.

It is with a mingled sense of doubt and appreciation that I attempt to acknowledge this most appreciated and distinguished honor, because I feel that the traditions of this Association and my long connection with it have meant so much to my professional life, and a great deal aside from my professional life. The professional attainments that have been gained through the Southern Surgical Association have not been all the attain-

ments we have acquired at these meetings. There has always been a spirit of fellowship and appreciation of high ideals that have meant much both to the younger and older members of the Association. I appreciated this all the more last night when Dr. Winslow read his address and outlined the aims of the Association. I think I can say now most sincerely that I came into this Association almost a boy at the Memphis meeting in 1898, and I started there the foundation of lasting friendships and close associations that have been a great leaven in the ideals that I have striven for.

In accepting this position as President, I shall endeavor to carry out the very high aims and ambitions so ably set forth by the far-seeing men, the pioneers, of the Southern Surgical Association. I thank you.

Afternoon Session. The Association reconvened at 2 P.M., and was called to order by President Miller.

37. "Traumatic Intracranial Hemorrhage, with a Report of Ten Operative Cases," by Dr. William Perrin Nicolson, Altanta, Georgia. Discussed by Drs. Mixter, Newell, Kerr, Coleman, McGlannan, and in closing by the essayist.

38. "The Clinical Picture of Benign Lesions of the Breast for Which Operation is not Indicated," by Dr. Joseph C. Bloodgood, Baltimore, Maryland.

39. "The Remaining Breast after Radical Removal of the Opposite Side for Carcinoma," by Dr. Hugh H. Trout, Roanoke, Virginia.

These two papers were discussed together by Drs. Horsley, Peck, Hall, Stone, J. H. Gibbon, Finney, Miller, Bovée, Gwathmey, Parham and Haggard, after which the discussion was closed by Dr. Bloodgood.

40. "Pelvic Tumors Attached to the Sacrum," by Dr. Arthur A. Law, Minneapolis, Minnesota, which was discussed by Drs. Cannaday and Blair.

41. "Demonstration of a New Skin Suture Material," by Dr. Edward H. Ochsner, Chicago, Illinois," which was discussed by Drs. Jonas, Buist and McGuire.

42. "Total Transposition of Viscera," by Dr. Henry H. Sherk, Pasadena, California. Discussed by Drs. Royster and Parham, and in closing by the essayist.

Dr. Bacon Saunders, Forth Worth, Texas, moved that a vote of thanks be extended to the Local Committee of Arrangements and to the Carolina Hotel for furnishing accommoda-

tions and for the sumptuous entertainment and courtesies extended to the Fellows and their guests during this meeting. Seconded and unanimously carried.

THE SECRETARY: It gives me great pleasure to state that this has been the best meeting we have ever had, except one or two! We have had read and discussed 41 papers out of 50. Each session came through on time without the postponement of a single paper. There were 104 Fellows in attendance, plus two Founders, making a total attendance of 106. Besides, there were 33 ladies and 27 visitors. There were 167 at the annual dinner, which is 5 more than we have ever had at this function.

The Secretary wishes to return his personal thanks to the retiring President and to the Fellows of the Association for giving him their hearty support, enabling him to carry on the program and to keep up the traditions of the Association.

On motion, which was duly seconded and carried, the Association then adjourned to meet in Memphis, Tennessee, December 12, 13, 14, 1922.

HUBERT A. ROYSTER, M.D.,
Secretary.

PRESIDENT'S ADDRESS

RETROSPECT AND PROSPECT

By Randolph Winslow, M.D.
Baltimore, Md.

For the great and unexpected honor of being your presiding officer at this, the thirty-fourth, annual session, I tender my most grateful thanks. That you have judged me worthy of this distinction is a source of the most profound satisfaction to me, though mingled with the sense of my own shortcomings; and yet in one respect it may not be inappropriate that I should be your President at this time, since I was born in this state and lived here in my youth, during the stormy time of the Civil War. Although I have lived for more than a half-century in the city of Baltimore, I still love the "Old North State," and the honor of being President of this distinguished body is enhanced by the fact that this annual session is held in the state in which I first saw the light of day.

Let me, first of all, congratulate the Association on the excellent and instructive scientific program that has been arranged for us by our active and efficient Secretary, Dr. Royster; to whom, as well as to the Committee of Arrangements, our thanks are also due for our delightful entertainment at this charming resort.

But I have another and a sadder duty to perform. The

past year has been especially disastrous to us in the loss of many of our most esteemed and valued Fellows, and I desire to take this opportunity to record their names upon our roll of honor, and to place a wreath of remembrance upon their tomb. Some of them were old men who had borne the burden and heat of the day, who were quietly awaiting the summons; while others were cut down in the strength and usefulness of mature manhood. While we bow to the inscrutable decree of God and in submission to His will, we are grieved that we shall no more take their hands in friendly greeting, nor hear their voices in pleasant discourse or in earnest debate. The names of the deceased Fellows are as follows:

Russell M. Cunningham, of Ensley, Alabama, a Founder of this body; Lieutenant-Governor of Alabama in 1904, who will be remembered by many of us as a very gifted speaker, died on June 6, 1921, aged sixty-six years.

Joseph Taber Johnson, formerly of Washington, D. C., but latterly living at Cherrydale, Va., a distinguished gynecologist, and emeritus professor of gynecology and abdominal surgery in Georgetown University, died on March 12, 1921. He was President of this Association in 1899.

William Kohlman, of New Orleans, La., died March 21, 1921, aged fifty-seven years.

Horace H. Grant, of Louisville, Ky., professor of surgery in the University of Louisville, died January 25, 1921, aged sixty-seven years.

William Edward McGuire, of Richmond, Va., formerly professor of gynecology in the University College of Medicine, of Richmond, died October 7, 1921, aged sixty-one years.

Floyd Wilcox McRae, of Atlanta, Ga., formerly professor of gastrointestinal, rectal and clinical surgery in the Atlanta College of Physicians and Surgeons; elected a member of this Association at its first meeting in 1888, and its President in 1904. A genial, kindly man, whose presence

will be sadly missed at our annual gatherings. He died August 13, 1921, aged fifty-nine years.

Frank Martin, of Baltimore, Md., professor of surgery in the University of Maryland; Lieutenant-Colonel, U.S.A., during the World War; an accomplished surgeon and a frequent contributor to surgical literature. His death occurred December 7, 1920, aged fifty-seven years.

William Martin Perkins, of New Orleans, La., senior demonstrator of surgery in Tulane University, died August 21, 1921, aged forty-eight years.

Joseph Ransohoff, of Cincinnati, Ohio, professor of surgery in the University of Cincinnati; a distinguished surgeon and a prolific writer; a Fellow whose loss will be severely felt, died March 10, 1921, aged sixty-seven years.

William O. Roberts, of Louisville, Ky., emeritus professor of surgery in the University of Louisville; a Fellow of this Association since 1888, and its President in 1910, died on April 1, 1921, aged seventy-two years.

Edward Groves Jones, of Atlanta, Ga., professor of surgery in Emory University, died October 6, 1921, aged forty-seven years. He was an active and useful Fellow of this Association.

> "*Pallida mors aequo pulsat pede pauperum tabernas*
> *Regumque turres.*"

"The memory of the just is blessed."

Fifty years ago I began the study of medicine at the University of Maryland, and, as was usual at that time, was graduated after an attendance on two short courses of lectures. Since then I have witnessed the stupendous changes in the science and art of medicine, which as a panorama has unfolded itself before my eyes. Anesthesia, it is true, had been in daily use for twenty-five years, and this boon had robbed surgical procedures of the greatest of their terrors; but the danger of infection was always present, and many well-designed and skilfully executed

operations failed on this account. The science of bacteriology scarcely had been born and the causation of zymotic diseases was still enshrouded in mystery. The epoch-making discoveries of Pasteur, in regard to fermentation and putrefaction, and the application of these discoveries, in a crude form, to practical surgery by Lister, were still neither generally known nor widely accepted. Under these circumstances surgery was confined mostly to the repair of injuries, to the removal of external tumors, to ligation of the more superficial vessels for aneurysm or injury and to operations for strangulated hernia. Abdominal surgery, as we understand it, was in its swaddling clothes, and was confined almost entirely to the removal of ovarian tumors, with very uncertain results. The appendix remained unmolested in its lair. Gallstones had been removed by Bobbs, of Indianapolis in 1867, but his example had not been followed by many physicians, and the stomach, liver, spleen and pancreas were practically immune to surgical attack. The kidneys were sacred organs and were considered beyond the pale of operative intervention. Operations on the intestinal tract were but seldom undertaken, and usually terminated disastrously; nor were the cranial or thoracic cavities more favorably circumstanced. Dieulafoy's aspirator had recently come into use, and efforts to cure empyema were being made through this means; but the chest was seldom opened to allow the escape of pus or for any other surgical intervention. The cranium was trephined for depressed fractures and occasionally for epilepsy, and this was about the limit of the surgery of the skull and its contents. The thyroid gland had been excised a few times, with high mortality, but even such a distinguished and progressive surgeon as Samuel D. Gross vehemently condemned the operation as unwarrantable in 1866, and John Eric Ericksen, in 1873, also disclaimed it as unjustifiable. The mammary gland was ablated for malignant growths, but the axilla was not cleaned out, nor were the pectoral

muscles and fasciæ removed. Under these circumstances a radical cure of cancer of the breast was well-nigh impossible. Even the uterus was allowed to keep its tumors in peace, and only the cancers of the cervix received surgical attention.

But it must not be supposed that surgery was at a low ebb. There were many surgeons of great attainments and of remarkable skill, and much successful surgical work was done. Many operations that are now done in safety were at that time prohibited on account of the danger of hemorrhage. The prevention of both primary and secondary hemorrhage was very uncertain, and operations of great magnitude would be undertaken with only a few bull dog forceps to catch the spurting vessels. Artery clamps such as are used at present had not been invented, and hemostasis was very imperfectly accomplished. Arteries were tied with silk, and one end of the ligature was cut close to the knot while the other long end was left protruding from the wound. These unsterilized ligatures could only be detached by ulcerating through the vessel, and it not infrequently happened that about the tenth day a secondary hemorrhage would occur, which often resulted fatally.

As has been stated, however, the greatest obstacle to advanced surgical work was infection. Most wound-healing was attended with suppuration, and the formation of a thick, creamy pus was hailed as a favorable token, and it was spoken of as "laudable pus." Erysipelas also was not uncommon, and was a menace not only to the success of the operative procedure but to the life of the patient as well; while septicemia, pyemia and other grave forms of systemic infection were by no means infrequent.

Diagnoses were chiefly arrived at by means of the special senses, as instruments of precision were but few. The clinical thermometer was in daily use, and the microscope was available for the examination of urine and other secretions, as well as for the examination of morbid tissues; but,

unfortunately, there were but few who could use it. The esophagoscope, bronchoscope and cystoscope were not yet invented, nor were the roentgen rays and their wonderful properties discovered until about a score of years later.

The causation of diseases was equally unknown. It was a decade later that Koch announced the discovery of the tubercle bacillus, and Laveran and others showed that malaria was due to a parasite in the blood. With the development of the science of bacteriology the secrets of the ages began to yield to the researches of the investigators, and disease was found to be due to microörganisms rather than to some inscrutable act of divine Providence.

With the recognition of the part played by germs in wound infection came the attempt to prevent infection by destroying the germs both before and after their lodgment in the wounds, and this was the era of the carbolic spray and the irrigation of wounds with strongly carbolized solutions. While the results were much improved by this means, which was known as antiseptic surgery, it was found that many serious disasters followed the use of carbolic acid on raw surfaces. Irrigations of wounds with corrosive sublimate solutions did not give much better results and gradually the use of strong chemical agents in wounds was discontinued. The era of aseptic surgery was now ushered in, which has continued to the present time. By aseptic methods we mean the sterilization of everything that will come in contact with wounded surfaces before such wounds have been made, rather than the attempt to kill germs in wounds after they have gained entrance thereto.

In 1873, the surgical world was thrilled by the announcement of the successful extirpation of the larynx by Billroth, and again in 1881, when the same brilliant surgeon successfully resected the pylorus. In 1881, also, the illustrious J. Marion Sims, leaving his special field of gynecology, devoted the last days of his life to advocating the operative treatment of penetrating wounds of the abdomen. In

1884, William T. Bull opened the abdomen for gunshot wounds of the intestines, successfully, and thus established practically Sims' theoretical opinion in regard to the treatment of these hitherto fatal injuries. It is not so well remembered, however, that our own Fellow, R. A. Kinloch, operated successfully for gunshot wounds of the intestines in 1862. Lawson Tait, at or about the same time, was operating successfully for pus-tubes and for other intra-abdominal conditions, which up to then had neither been accurately recognized nor successfully treated. In 1886, Reginald H. Fitz published his observations on inflammations in the right iliac region of the abdomen. This opened the way for the development of the surgery of the appendix, which has been followed with such brilliant results.

This brings us to the time of the organization of this Association. Let us pause for a moment to consider the state of medical affairs in the South soon after the close of the Civil War.

The South was absolutely impoverished and many of its ablest physicians and surgeons migrated to the cities of the North, where they soon achieved reputation and prosperity; but many others remained in their native land, where they ministered to their people without much thought of any substantial reward. They had neither the time nor the money to permit them to attend medical conventions in remote places. The American Medical Association was the only National society at that time, and its meetings were quite small; but as soon as the disturbed condition of the country became more settled, other National societies began to spring up. Thus the American Gynecological Association was organized in 1876, and the American Surgical Association, the last work of the revered Gross, was founded in 1880. The honors of the association were quite impartially distributed, however, as in the first ten years of its existence four surgeons from the South occupied the presidential chair: William T. Briggs, of Nashville; Hunter

McGuire, of Richmond; David W. Yandell, of Louisville; and Claudius H. Mastin, of Mobile.

But the leaders of surgical thought in the Southern states did not think that this Association afforded a sufficiently broad field for the needs of the Southern surgeons, and hence the Southern Surgical and Gynecological Association was founded on October 12, 1887. Article II of the Constitution, adopted in 1888, says: "The object of this Association shall be to organize the profession of the South in the most efficient manner possible for the advancement of the sciences of surgery and gynecology"; and President William D. Haggard, the father of our distinguished Fellow and ex-President, William D. Haggard, Jr., in his inaugural address, said: "The Southern Surgical and Gynecological Association did not spring voluntarily into existence, but was the outgrowth of necessity and is the embodiment of unknown power."

From these quotations we see that the original reason for the organization of this Association was the imperative need of the physicians and surgeons of the South for instruction in surgical science and for association with the leaders of surgical thought. The expression of the first President, that the Association is "the embodiment of unknown power," comes down to us as a prophecy, of which we now see the fulfilment. We now know that the effect of the action of the Founders of this society has been to develop as able a body of surgeons as can be found anywhere in this country or abroad, and to greatly stimulate the science of surgery throughout this country.

The second President of this Association was Hunter McGuire, beloved and revered in the South and honored throughout the whole country, whose distinguished son, Stuart McGuire, has followed in the footsteps of his father and has served acceptably as President of this body. Dr. Hunter McGuire, in his Presidential Address in 1889,

said: "Let our motto be lofty aim and united action. As Southern men let us show the world that, under changed conditions, we have still the stamina of our forefathers. As members of our beloved profession, let us strive to be first in scientific attainment, first in integrity, first in high purpose for the good of mankind." This was a high standard to be set as the object of an organization which was in its infancy, and which at that time was limited in its membership to surgeons of the former Confederate states. But has not the inspiration been attained? I think it has to a very large degree. The aim of this Association has always been lofty and its scientific work has been such as to stimulate not only the surgeons of the South, but those of the other sections of our country as well, to exert their best efforts for the good of mankind.

The first annual meeting was held in Birmingham, Alabama, December 4, 5, 6, 1888, at which there were 41 members in attendance and 50 guests. The members were all from the twelve Southern states, including Kentucky. Of these, Drs. J. D. S. Davis, John W. Long, L. S. McMurtry, F. W. Parham, Isaac S. Stone, H. M. Taylor and W. F. Westmoreland, Jr., remain with us today as honored Fellows of this Association. Papers were presented by Dr. Westmoreland, Jr., on "Treatment of Fractures with Plaster-of-Paris Splints"; by Dr. J. D. S. Davis, on "Electrolysis in Morbid Alterations Produced in the Prostate by Gonorrhea of the Urethra"; by Dr. J. Wesley Long, on "Practical Aseptic Surgery"; and by Dr. Isaac S. Stone, on "The Field and Limitation of Laparotomy," all of them valuable contributions to very live problems.

The Southern Surgical and Gynecological Association, however, could not long remain strictly a local society, and soon we find surgeons from other parts of the Union seeking its membership, until for a long time past it has been a national society in everything but name. It is true that

the bulk of its membership comes from the South, in accordance with the Constitution, Article II of which, as amended in 1890, reads: "The object of this Association is to further the study and the practice of surgery and gynecology among the profession of the Southern states." But what an array of illustrious names of former and present Fellows from every section of our country are inscribed upon its roster! From Portland, Maine, to Portland, Orgeon; from Boston to Galveston; from Minneapolis to New Orleans; from Chicago to Jacksonville; from New York to San Francisco, and from Philadelphia to Los Angeles, surgeons whom we delight to honor have honored us, and honor themselves by seeking fellowship with us.

Among so many distinguished Fellows now with us it would be an ungracious act to name any single individual as deserving of especial praise; but this does not hold good for those who, having wrought mightily in their day, now rest from their labors. In the early days of the Association, when it was doubtful whether it would live or die, the great influence of our second President, Dr. Hunter McGuire, of Richmond, Va., was a strong factor in placing it on a solid foundation and in giving it the scientific standing which has continually increased to the present day. The prosperity of the Association was also greatly enhanced by the faithful work of Dr. W. E. B. Davis, of Birmingham, Ala., who was its Secretary from its organization in 1887 until 1900, and its President in 1902. In fact, we have been highly fortunate in our Secretaries, having had but three in the thirty-four years of the existence of the society. Among other notable Fellows who greatly added to the reputation of the Association may be mentioned: Richard Douglas, of Nashville; John B. Murphy, of Chicago; Joseph Price, of Philadelphia; Louis McLane Tiffany, of Baltimore; Maurice H. Richardson, of Boston; Roswell Park, of Buffalo; Joseph Ransohoff, of Cincinnati, and George Ben Johnston, of Richmond—all of whom have

now passed to the great majority. We honor them for their accomplishments and we miss them at our annual gatherings.

In looking through the *Transactions* I have been greatly impressed with the great variety of subjects presented by the authors and the full and valuable discussions thereon. A veritable epitome of the progress of surgery is to be found in these yearly publications. Moreover, the initial purpose of the Association has been fulfilled. The surgeons of the South no longer require any special tutelage in surgery or gynecology, but are the peers of their colleagues the world over. They are the legitimate successors of those wonderful pioneers of the past: Ephraim McDowell, the father of ovariotomy; Crawford W. Long, the first to use ether as an anesthetic; and J. Marion Sims, the father of modern gynecology; besides a host of others whose achievements, while not so outstanding, have added much to the relief of suffering and the prolongation of human life. They were, however, more skilled with the scalpel than with the pen, and their deeds were slow in getting into print and in securing for their authors that recognition to which they were entitled.

Our infant Association has now developed into full maturity and has acquired adult strength. Its object is no longer limited to the development of the study and practice of surgery in the South, but extends to all parts of our country. It is a National society. In what way can its influence and usefulness be increased? First, by exercising great care in the election of Fellows. Dr. Bedford Brown, in his presidential address in 1893, said the membership included three classes of physicians: (1) Specialists in surgery and gynecology; (2) eminent practitioners who did some surgery and gynecology; (3) young surgeons of promise who had not yet reached prominence." While this classification may have been necessary in the early days of the Association, it is now neither necessary nor proper, and, in fact, is no longer observed.

In my opinion the Fellowship should consist of specialists in surgery, including gynecology, who have attained prominence in their profession by their work and by their contributions to surgical literature. There are many excellent surgeons who operate successfully but who neither write nor discuss surgical papers. Such individuals are not entitled to become Fellows of this Association. Secondly, this Association is not a kindergarten for the development of fledglings in surgery who have not yet acquired full adult plumage, however promising they may be; and, in my opinion, a period of eight to ten years should have elapsed from the time of graduation before they should be eligible for election to fellowship in this society. Third, Fellows who do not attend the meetings and present papers at least once in three years are mere parasites and should be dropped, unless some reasonable excuse is given for their delinquency.

It is a great honor to be a Fellow of this Association; but with this honor goes a responsibility: first, to live up to the highest ideals of professional rectitude, and second, to contribute to the general stock of surgical knowledge. Have we done this? In the main I think we have. We have a large number of very active members who are usually found present at our meetings and who contribute largely to our programs; but there are also quite a number of names on our roll, of men who have absented themselves for protracted periods and who have not contributed anything to the interest or advantage of the Fellows of this Association. Such persons are barnacles on our craft that ought to be removed. As we have many more applications for fellowship than can be elected, the question of increasing the number of Active Fellows naturally comes up for consideration. I think it would be a mistake to do this, as a larger number would be too bulky for a society of specialists and would tend to lessen the distinction of fellowship in this Association. Let our membership then consist of those who by their work have shown that they

are entitled to this honor, and who value their membership sufficiently to attend the meetings regularly and to contribute to our scientific proceedings.

Many years ago a prominent author, I think it was Ericksen, said surgery had reached its peak; that there would be some refinement in technic, but surgery could not advance farther. Since that time surgery has been revolutionized, and the brain and spinal cord, the heart and lungs, the abdominal and pelvic organs, the thyroid and prostate glands, and the aorta and great vessels have all been made accessible to successful surgical attack; while plastic and reparative surgery have reached a degree of perfection not dreamed of by our forbears in their wildest flights of imagination. In this advance of surgical science and art, Fellows of this Association have played an important part; and we have to pay our homage to those who are dead, and to offer our congratulations to those who are still living and striving in the interest of their fellow-men.

But what of the future? Has the limit of surgery been reached? Nay! I verily believe we are but on the threshold of discoveries that will add greatly to the life and happiness of the human race, in the prevention and cure of conditions which are now both unpreventable and incurable. The note that I would wish to sound is one of abounding optimism and of unbounded faith in the victorious march of our guild to heights that have never yet been scaled or even envisaged through the mists of the ages. In this advance it is both my ardent hope and earnest expectation that the Southern Surgical Association shall take a leading part.

"Men, my brothers, men the workers, ever reaping something new:
That which they have done but earnest of the things that they shall do."

SURGICAL TREATMENT OF EXTENSIVE BASAL CELL CARCINOMA

By J. Shelton Horsley, M.D.
Richmond, Va.

The pathologic laboratory has been of great assistance in the surgical treatment of tumors, and particularly of cancers of the skin. The two general divisions of cancer of the skin are the spinous cell type (Fig. 1) and the basal cell type (Figs. 2 and 3). Each of these is susceptible of many subdivisions.

There is an occasional form of cancer of the skin known as the melanocarcinoma, which was formerly classified as a sarcoma but which has been proved to come from the epidermis. It is exceedingly malignant. Occasionally this cancer occurs without pigment, or with only a trace of pigment, but it follows the same general course as when abundant pigment is present. This cancer springs, apparently, from the deep layers of the epidermis, and in some instances resembles more closely in histologic structure basal cancer than spinous cell, though its clinical course is quite different.

Besides these, there are the rarer forms of cancer of the skin, originating from the sebaceous glands or the sweat glands. They are adenomatous in structure.

The division of spinous cell cancer of the skin into four grades by A. C. Broders, of the Mayo Clinic, has been very helpful to the surgeon. These grades are according to the degrees of differentiation of the cells. The type in which

the "pearls" largely predominate, showing a marked tendency of the squamous cells to go through their full life cycle, including the stage of cornification, is the least malignant, and requires the simplest operation. When it occurs on the face, a limited excision, without a dissection of the neck, is usually sufficient for a cure. This kind of cancer is classed as "grade one." The second grade has fewer "pearls"; the third has very few, and the fourth grade, which is the most malignant, has none at all. The fourth grade of this cancer is rarely cured, even by the most extensive operation. Operation for the second and third grades must be much more extensive than for the first grade, as the growth is more rapid, and the tendency toward metastases is much greater.

Basal cell cancer, or "rodent ulcer," as it is sometimes called, does not form "pearls." Its cells may vary greatly in size and shape from a slender spindle cell to a round cell, and occasionally may assume what appears to be an adenomatous structure (Figs. 2 and 3). This occasional tendency to an adenomatous structure in basal cell carcinoma may be due to the fact that embryologically the cells of the basal layer of the epidermis are more closely related to the sweat glands and the sebaceous glands than are cells of the more superficial layers.

A basal cell cancer is usually less malignant than the spinous cell cancer, particularly if the first grade is excluded. After it has become extensive, however, it is exceedingly difficult to cure. A very interesting fact about basal cell cancer is that it does not metastasize, but extends only by continuity or contiguity of tissue. This is impressive when we recall that a basal cell cancer may occupy the same region of the face as the spinous cell often occupies, and consequently has access to the same lymphatics. The cells are usually smaller than the spinous cells, and should gain access to the lymphatics just as easily as the spinous cells do. It seems most probable that the basal cells are

taken up by the lymphatics, but do not find favorable soil, and consequently perish; while the cells of the more malignant grades of spinous cell cancer can grow in the lymph glands and channels.

It may be assumed, then, that there is something in tissues at a distance from the basal cell cancer that causes an insuperable resistance to the cells of this neoplasm. This is not true of the spinous cell cancer, particularly of the more malignant grades, which may flourish wherever they are deposited by the lymph channels.

A crude illustration may show this biologic difference: If there was a field containing dry broom-sedge, and a fire was started in the middle of it, not only would the fire burn from this point, but if there was carried a burning brand to any other part of the field, it would also burn there. This may be likened to the spinous cell type of cancer, in which there is no resistance to destruction by fire, even at a point distant from the original fire. If, however, the field of broom-sedge was damp, and a fire was started in the middle with a sufficient amount of inflammable material to dry the broom-sedge in its immediate vicinity, the fire would extend as far as the heat had dried the broom-sedge. If a burning brand should be carried into other portions of the wet field, it would not start a fire, because the dampness would render the broom-sedge uninflammable, unless the fire was sufficiently large to dry the broom-sedge first. This might be compared to the basal cell type of cancer.

It appears to be perfectly useless to treat an extensive basal cell cancer by operation with a knife. The tissue in the immediate neighborhood of the cancer has had its natural resistance broken down, doubtless by some product of metabolism formed during the growth of the cancer. The cancerous cells are simply implanted on the new raw surface, whose resistance against these cells has been destroyed, and they grow rapidly. In practically all cases that have become extensive, the roentgen ray or radium

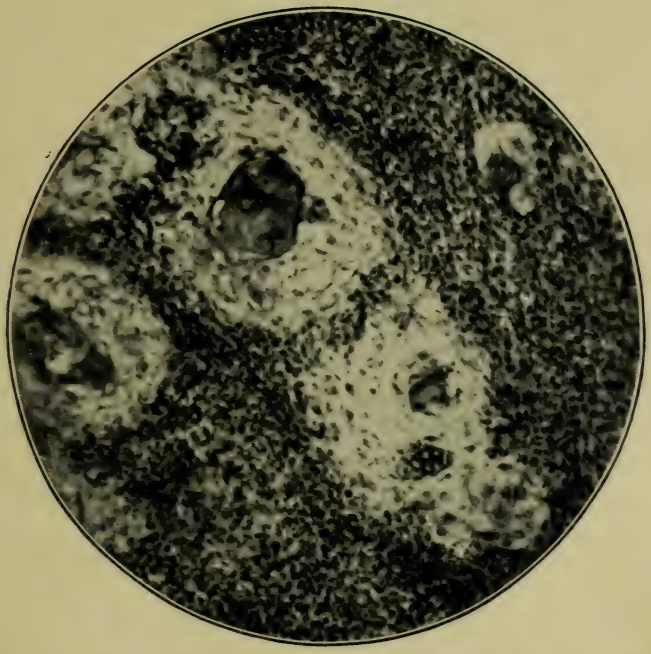


FIG. 1.—Reproduction, slightly reduced, of a photomicrograph, × 125, of a spinous cell type of a squamous cancer, showing definite "pearls," which do not occur in basal cell cancer.

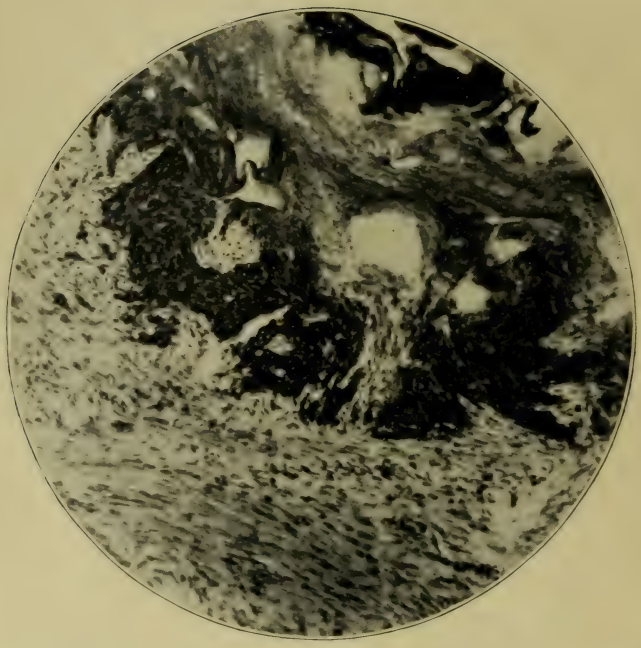


FIG. 2 (Case 1).—Basal cell cancer. The upper border shows the results of the cauterization, which was done before the excision. In spite of a thorough cauterization, there were areas in which the typical cells of a basal cell cancer were found. Slightly reduced from a photomicrograph, × 155.

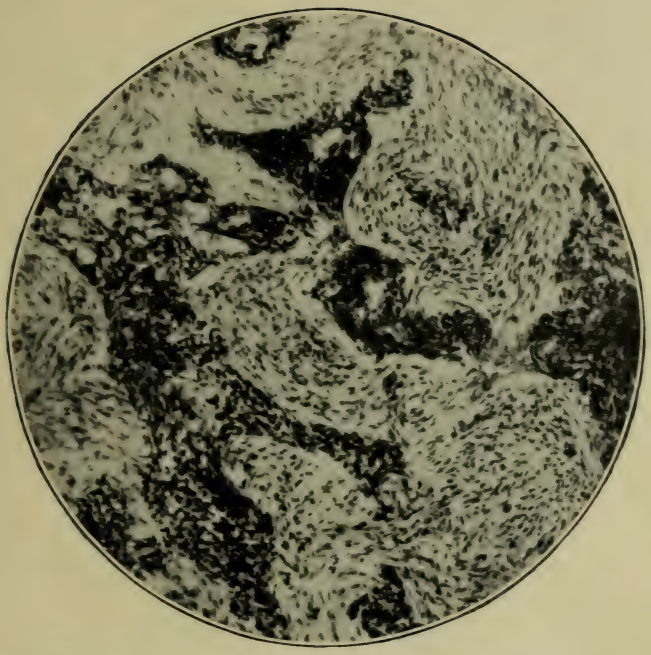


FIG. 3 (Case 2).—Basal cell cancer. This area is from the mucous membrane. The cells penetrated rather deeply along the margin of the mucosa, but apparently never more than about one-quarter inch (6 mm.) from the edge of the ulcerated area. The most recent recurrence beneath the lower eyelid shows the basal cells rather round in shape. There is some tendency toward an adenomatous-like arrangement in certain areas of this photomicrograph. Slightly reduced from a photomicrograph, × 155.

FIG. 4 (Case 1).—Basal cell cancer before operation.

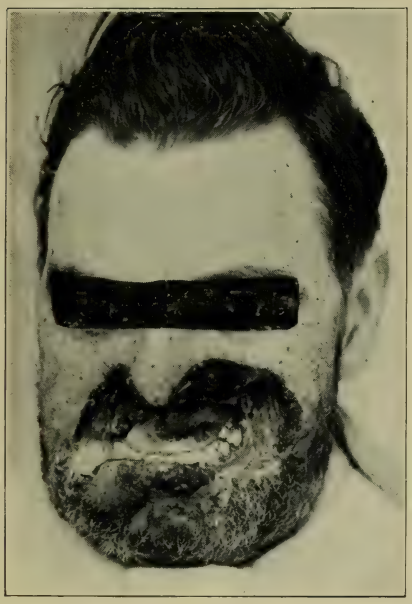


FIG. 5 (Case 1).—Condition of the mouth sixteen days after operation. The slough had not yet fully separated. The flap in the neck had been outlined, but does not show here.

FIG. 6 (Case 1).—About a month later. The slough had separated, the wound had partially healed. The flap in the neck had been gradually dissected free, and its under surface is covered with Thiersch grafts. It is ready to be transplanted to the region of the upper lip, according to the method described in the text.

has been tried and has failed, so but little can be expected from this source.

The principles that appear to underlie the surgical treatment of extensive basal cell cancers demand, first of all, that the surface of the cancer be destroyed and sealed by cautery so that transplantation of cancer cells will be avoided; secondly, that the excision be done as far as possible with the electric cautery and the raw surface be further cauterized after the excision has been completed; and thirdly, that the raw surface be covered as soon as possible by tissue from a distance, where the normal resistance to cells from a basal cell cancer has not been destroyed.

Report of Cases. The application of these principles can best be elaborated by a description of two cases of very extensive basal cell cancer of the face in which I have operated:

Case I.—G. K. P., a man, aged forty-nine years, white, a lawyer, was admitted to St. Elizabeth's Hospital, Richmond, May 1, 1920. The Wassermann reaction was negative. The patient had had considerable albumin in the urine for many years. He had also suffered occasionally from "stomach trouble." There were a few casts, but the patient's nitrogen blood urea on admission to the hospital showed renal function about normal. About fifteen years ago a small mole on the patient's left upper lip was injured by a barber while combing his mustache. A small ulcer formed, which for two years alternately healed and broke down. He was operated on by a local surgeon, and the ulcer healed, but in a few days broke down again. The patient then went to an advertising cancer paste doctor, who applied a paste, but the disease recurred. He had been operated on by a number of surgeons, and had tried many different remedies, ranging from the advertising cancer cures to the application of radium in large quantities by skilled hands. The growth would sometimes be retarded

for a while, and would remain apparently cured for several months, but eventually broke down again.

After a thorough examination, and particularly after a careful test of the kidney function by blood chemistry and by phenolsulphonephthalein, it was thought that he could take ether satisfactorily. (Fig. 4.) May 6, after the administration of ether in the usual manner, a transverse incision was made in the upper part of the trachea, and a tube inserted through which the ether was then administered. The mouth was opened and the pharynx thoroughly packed with moist gauze. The cancer, which had extended so that it had destroyed the upper lip, part of the nose, and most of the anterior part of the alveolar process, was well cauterized with the Percy cautery. The mass of tissue was then excised with a sharp electric cautery down to the bone, and the bone was divided with chisel, rongeur forceps and electric rotary saw. The raw surface was immediately cauterized with the Percy cautery and packed with iodoform gauze. The wound in the trachea, which was transverse, was closed, and a flap was outlined on the left side, with its base near the lower jaw and the body of the flap over the left pectoral region. The pedicle of the flap was dissected up, and its edges were brought together with a continuous suture of catgut, according to the method of Gillies, making a cord of the pedicle. The margins of the skin beneath the pedicle were undermined and united.

Seven days later, under local anesthesia, the upper part of the flap was dissected free and two Thiersch skin grafts from the left thigh were applied. Eight days later, still more of the graft was freed and Thiersch grafts were applied, and the same procedure was repeated eleven days later. (Figs. 5 and 2.)

June 9, thirty-five days after the original operation, the flap was completely severed, and the remaining raw surface on the flap was covered with Thiersch grafts. July 2, the upper border of the flap was denuded, dissecting back the

epithelial surface on both sides, and after further denuding the right side of the defect in the face, the flap was applied to the face. July 7, the anterior surface of the hard palate was denuded, and corresponding denudation was done on the inner surface of the flap, on which Thiersch grafts had been applied. The margins of the wound on the face were freely denuded and dissected up, and the flap was applied carefully to all of the old area where the cancer had been excised. (Fig. 6.)

After a week the pedicle of the flap was compressed by soft-bladed forceps for about a half-hour each day, and on August 4 the pedicle was completely severed and the base of the flap sutured into position. The pedicle was unfolded, and used to cover as much of the raw surface on the neck and chest as possible. The graft took satisfactorily.

January 8 and February 23, 1921, some plastic work was done on the flap in order to improve the cosmetic appearance and to cover an area from which the flap had retracted. The patient was advised to have a dentist fit him with a plate which would supply him with teeth for the upper jaw. There was a good molar tooth on each side of the upper jaw, and it was quite possible to use these as points of fixation. However, while the dentist was fitting the plate it slipped, and lodged for a short time in the patient's pharynx. This experience was so disagreeable that he has never been induced to have any further dental work done; without which, of course, the cosmetic results cannot be greatly improved.

The patient suffered a sudden severe abdominal pain, April 4, 1921, for which he was admitted to St. Elizabeth's Hospital. A careful examination by Dr. Warren T. Vaughan, and roentgenoscopy, revealed no lesion in the abdomen, but a marked dilatation of the thoracic aorta. The pain seemed to be anginal. After a few days it gradually disappeared, and the patient's general condition improved. When seen, recently, three weeks ago, he was in good general

condition, and there was no sign of any recurrence of the cancer, more than eighteen months since the operation.

Case II.—Mrs. D. W., aged fifty-five years, who had mitral stenosis, was admitted to St. Elizabeth's Hospital, September 27, 1920. About twenty years ago there was a small pimple on the left side of the nose, which bled profusely after she had scratched it. Various salves were applied without success. It was treated with the roentgen ray, which relieved the patient for several years. A small ulcer then formed between the eyes on the forehead. This healed, and later the tip of the nose was affected in a similar way. The patient had radium applied in Baltimore on four different occasions, the last one being August 26, 1920. The cancer involved the right cheek and right upper lip and nose.

September 28, the trachea was opened transversely and the anesthetic was continued through the tracheal tube, the procedure being similar to that described in the previous case. The pharynx was then packed with moist gauze, and the cancerous area was thoroughly cooked with the Percy cautery. The margins of the cancer were removed with a sharp electric cautery and the bone with rongeur forceps. A flap was outlined on the right side of the neck and chest, with its base near the right jaw. The pedicle of this flap was treated as in the previous case. A flap was also outlined on the forehead, with the base of the pedicle over the right temporal region, and the lower margin of the flap over the right eye. The packing was removed from the pharynx and the trachea closed.

At intervals of several days the flaps were gradually dissected up under local anesthesia, and were finally transplanted into the region of the defect. November 19, a small spot of recurrence on the mucosa of the left upper lip was removed with the electric cautery. December 17, the pedicle of the flap from the neck was divided under

local anesthesia. January 3, 1921, the pedicle of the flap from the forehead was divided. On account of the location of the disease, it was impossible to get the raw surface of the flap fitted to all the raw surface left by excision of the cancer. This was due to the fact that the right antrum of Highmore was widely opened, and was filled by a flap with the epithelial surface within. An effort was made to denude the flap and apply it where the cancer was excised. On the left side of the face it was impossible to make permanent contact at all points because of tension, and at the floor of the antrum the raw surface could not be covered by the raw surface of the flap.

February 4 and March 3, 1921, plastic operations were done to cover the defect over the bridge of the nose from which the flap had pulled loose. April 20, there was a recurrence of basal cell cancer in the inner portion of the wound in the hard palate. At this point the skin surface of the flap from the neck rested, and no raw surface from the flap. This area of recurrence was about one-half inch (1.3 cm.) in length, and was excised under local anesthesia with the electric cautery, some of the bone being also removed. A subflap was cut from the main flap that had been turned in from the neck, and was sutured to this defect in the palate, after a small flap had been dissected from the rest of the hard palate in order to make the union more secure.

July 23, there was a recurrence on the lower border of the anterior portion of the vomer and along the left edge of the upper jaw. These areas were thoroughly cauterized, the bone and part of the septum with the vomer were removed with rongeur forceps, and the raw surface was again cauterized. A flap was made from the frontal flap that had been turned into the defect, and was sutured over this raw surface. The sutures cut loose, however, and the flap soon retracted.

September 24, there was a small point of recurrence along the anterior part of the stump of the alveolar process

on the right side, and a small suspicious spot on the upper left side. These points were cauterized with the electric cautery, removed, and again cauterized. It seemed impossible to cover the point at the stump of the right alveolar process with tissue from the flap, so the nearest portion of the flap was cauterized, with the hope of making a raw surface that would become adherent.

Instead, however, of becoming adherent, it retracted further, and in November, 1921, there was a recurrence again at this place and also in a small mass beneath the lower right eyelid. Both of these recurrences were removed with cautery in the usual manner, November 28. A plastic flap was arranged from the original flap by dividimg the original flap vertically into two pieces and cutting it so the raw surface would cover the region where these recurrences were. The patient is still under observation.

Comment. In every instance in which there was a recurrence, it was at a point where the raw surface of the transplanted flap had not grown. Where the raw surface of a transplanted flap had become attached, even for a period as long as a week, and had subsequently pulled away, there was no recurrence. If the flap pulled away within two or three days, recurrence was occasionally noted in this area. In no single instance, however, has there been recurrence where the raw surface of the transplanted flap had grown to the raw surface left by the excision of the ulcer. On account of the extensive and unusual location of the cancer, it was impossible to apply the raw surface of a flap in a satisfactory manner to all of the raw surface left by excision of the cancer at one operation without making the incisions of such a character as would have jeopardized the nutrition of the flap. These facts concerning the points of recurrence in this case seem to emphasize most strongly the apparent inhibitive power of tissue taken at a distance from a basal cell cancer over the growth of cells from this

neoplasm. Though there have been numerous recurrences, the observed facts here tend even more strongly to confirm this principle than in the preceding case, in which there was no recurrence.

It seems logical to conclude, therefore, that in extensive basal cell cancers, in addition to cauterization and excision with a cautery, an important principle is to apply as soon as possible, to the raw surface from which the cancer was excised, the raw surface of a pedunculated flap transplanted from a distance. It was formerly thought that plastic operations for defects caused by the extirpation of cancer should not be done until it had been determined, after the lapse of months or of years, that there would probably be no recurrence. The idea seems to have prevailed that it would be useless to transplant a flap when cancer might recur beneath it. With basal cell cancer, however, this practice appears to be erroneous, and a flap from a distance should be applied as soon as possible after the excision of the cancer, for the flap seems to add an additional obstacle to the growth of the cancer by interposing its own natural resistance to the cancer cells.

THE TREATMENT OF CANCER OF THE TONGUE

By Curtis F. Burnam, M.D.
Baltimore, Md.

Our craft has long been in possession of most of the existing knowledge of tongue cancer. For many years contributions have been almost exclusively in the way of refinements and not fundamental steps forward. Until quite recently, surgical removal has been the sole method of effective treatment; now radium must be given consideration. Although surgeons have had the therapeutic difficulties of the disease almost daily before them, there are, nevertheless, wide divergences of opinion as to what is the best treatment in any individual case and as to what direction united endeavor should take to improve methods, which still leave much to be desired.

A casual study of literature now twenty years old shows that tobacco, bad teeth and syphilis, as the producers of chronic irritations, were considered the chief causes of the disease; that the incidence was many times as great in men as in women; that the spread was by the lymphatics; that the entire tongue and adjacent structures are united by an exceedingly rich network of lymph vessels; that the chief collecting vessels run directly to the deep cervical, submaxillary, submental and sublingual lymph glands, and from these primary stations to all the glands of the neck from the clavicle to the mastoid; that the cancer was nearly always of the spinous cell variety; that wide extirpations

were essential to cure; that permanent cures, even when the glands were involved, were obtainable in a certain number of the cases treated; that the earlier the treatment the better the results; that all the present operative methods for removing the tongue or parts of it were practised; that tuberculosis, syphilis and decubitus sores and nodules offered differential diagnostic difficulties and that microscopic determination was important; that the loss of one-half of the tongue did not greatly interfere with function and that speech was occasionally possible even after total removal of the tongue.

During the last two decades the development of the two-stage operation, of the cautery knife uses, of local anesthesia and of Crile's block dissections have undoubtedly lowered primary mortality in the extensive operations and extended the possibilities of five-year cures to some advanced cases.

PRE-CANCER. I subscribe to those who hold that the time to treat cancer is before it is cancer. That tobacco, syphilis and bad teeth cause the disease and that the first lesion or irritation is usually not cancer are facts that cannot be drummed enough into the public mind. If everybody believed and acted on these views, tongue-cancer deaths would not cease but would be greatly reduced in frequency. Some cancers, particularly those on the back of the tongue, begin without warning, and some precancerous lesions cannot be cured. I have personally seen two cases of syphilitic tongues and mouths, under every conceivable care, go on to cancer and death, and I believe that many others are on the same road.

Well-circumscribed spots of leukoplakia and small ulcers are best removed by the thermocautery; large areas of thick leukoplakia by radium. Whichever method is used, it must be supplemented by the removal of all conceivable sources of further irritation. The universal syphilitic glossitis, already referred to, is an extremely dangerous and

not uncommon disease. Small lesions that appear on the surface of the tongue may be removed. No case that I know of has ever been cured, but they can be helped by antisyphilitic remedies combined with great care of the mouth.

Differential Diagnosis. Before treating tongue cancer it is essential to know that there is cancer. If this is not determined, then dangerous, painful, mutilating and useless treatment may result.

In a series of 281 tongue lesions, studied at the Howard A. Kelly Hospital, there were 207 cancerous and 74 non-cancerous conditions. Among the 74 non-cancerous were decubitus ulcer, syphilitic ulcer, syphilitic nodule, tubercular nodule, tubercular ulcer, fibroma, adenoma, angioma. In one tubercular lesion there was no evidence of tuberculosis elsewhere.

The presence or absence of a history of syphilis, or of a positive Wassermann reaction, is of subordinate importance and can be misleading. The association of cancer and syphilis is frequent and both conditions when present demand treatment. Negative general findings, as well as history and blood findings, do not exclude syphilis: In two of our cases there were apparently extensive cancers of the tongue, tonsil and contiguous lymph glands and nothing in either history or findings to suggest syphilis, and yet both were syphilis.

A microscopical diagnosis is usually simple, in no way complicates the treatment, and is, I feel, essential in every case. In small lesions of the side, tip and anterior dorsum, the entire lesions with a wide margin of normal tongue should be removed with the thermocautery. In large open ulcers a simple pinching off of a small piece suffices. Immediate frozen sections are convenient, if not absolutely indispensable. At the time of the tissue removal and microscopical diagnosis, preparation should have already been made to carry out whatever treatment is indicated.

Classification for Purposes of Treatment. Tongue cancers have been classified, by those writing about them, as operable and inoperable, as early operable and late operable. Actual case consultations with a number of surgeons have convinced me that these terms mean very different things to different men. My own views are that "early operable" is a term that should be restricted to lesions limited to one side of the movable portion of the tongue, or to a small area of the movable dorsum or under surface of the organ, and to cases without detectable gland involvement; that when the floor of the mouth, the tonsils or the epiglottis is involved, small cancers are no longer "early operable" cancers; that cancers which involve a large part of the movable tongue, necessitating its complete removal, are very "late operable" conditions, even when no glands are present; that the presence of involved glands always means the case is late; that widely disseminated gland involvement, fixation in the mouth, extraglandular cervical extensions are positive evidence of inoperability.

We are in possession of some data bearing on the frequency of metastasis to the cervical lymph glands in early cancer of the tongue. In 26 cases of early but definite tongue cancer, where a period of three years has elapsed and where the local lesion has been removed and has not recurred, there has been development of cancer in the cervical glands in 13 cases.

I am inclined to believe that about 50 per cent of these early cases are curable by curing the tongue lesions. Joseph C. Bloodgood, in a recent publication, states that he has 62 per cent of cures in this group. In early cases local recurrence in the tongue is fairly infrequent after a wide removal; it is very common in the late cases.

My own experience and the available literature offer no solution to several problems which seem vital to organizing and improving surgical treatment. Would a systematic removal of the deep cervical, submaxillary and sublingual

glands in the early cases improve results of simple treatment of the lesion of the tongue? Theoretically it should. What proportion of cases with definite involvement of glands in the neck and a small lesion of the tongue stay well from radical surgical treatment? What percentage in cases stay well from local or complete extirpations of the locations which I classify as advanced or unfavorable?

I believe that complete removals of the tongue are unjustifiable in early cases and usually useless and harmful in advanced cases. I also believe that the sum total of removals in extensive neck metastases, where the disease is outside the glands, does much more harm than good.

It seems to me that it might be possible during the next year for each member of the Association to get together his own results from tongue cancer operations and for the whole to be combined into a joint report. If this could be done, conclusions of a definite practical nature ought to be arrived at.

Radium. Our early work with radium in tongue cancer was discouraging. Because of the difficulties of application and because of the great discomfort associated with burns in the mouth, it was found impossible to apply the methods found so satisfactory in uterine cervical epithelioma. It was usually possible to shrink and retard growth and to relieve pain—*i. e.,* if we avoided burns—but no advanced cases got well, and in the early cases it seemed that surgery did the same thing more easily and with less discomfort to the patient.

However, from this early period we have had some persistent cures—1 of eight years, 2 of seven and a half years, 2 of six and a half years, and 2 of five years; 5 of these cases must be classified as "early operable" and 2 of them were comparatively small lesions, but extended to the tonsils and were associated with definite gland involvement at the angle of the jaw of the same side. In these 2 cases strong radium needles in addition to surface application from the oral cavity and the outside were used.

Between the years 1916 and 1920 nearly all our operable cases were treated by operation, and radium employed externally as an adjunct to the treatment. During these years a large number of inoperable cancers were treated by needling, local applications in the mouth and heavy distance radiation from the surface. In spite of shrinkage of growth, sometimes disappearance in the tongue and undoubted amelioration of symptoms, the results were nevertheless disappointing, for there were no cures. It is only fair to say that the technic employed in these cases was not nearly so theoretically good as those which we could employ now.

Since 1920, under the stimulation received from the General Memorial Hospital, and particularly from Dr. Douglass Quick, we have taken up again the treatment of early operable cases with radium, and we agree with his conclusion that radium has a much more definite field in treating the tongue and mouth lesions than has surgical removal. This advance in radium therapy has been made possible by the bare-tube technic. It is possible by this method to eradicate not only small and moderate-sized tongue lesions, but also very large ones in a high percentage of cases treated. My own experience is too short to pass on the permanency of the results, but experiences in other fields justify the belief that they will be permanent. Dr. Quick, in his two and three year cures, has practically demonstrated this permanency. The severe burns and pain that followed intense surface and ordinary needling are to a great measure obviated. Whether the obvious tremendous improvement in results is due to the fact that the method permits of a very great uniformity of the radiation, or whether it is due to the employment of an extremely prolonged mixed beta and gamma radiation instead of the intense, short gamma radiation of the older method, is not clear.

Technic. The bare-tube technic is based on the introduction into the tissue of a tiny glass capillary tube, 2 or

3 mm. long and a fraction of a millimeter in diameter. This tube contains radium emanation; it decreases in strength approximately one-sixth each twenty-four hours and has in thirty days lost practically all of its strength. The thin glass wall allows the passage of both gamma and beta rays. The tube itself can readily be deposited in tissue by threading it into a hollow needle, introducing the needle to the desired place and pushing the glass tube out with an obturator.

Tubes containing 1 mc. of emanation should be implanted so that each cubic inch receives about 10 mc. of emanation. Before undertaking the treatment the tongue should be carefully studied, the cubic contents of the volume to be implanted determined and enough emanation tubes ordered to put one in the center of each cubic centimeter and a quarter of tissue. In estimating the area to be implanted, not only the lesion but a wide margin in every direction should be taken in. For lesions on the front of the tongue ordinary straight needles suffice; special needles are very convenient for lesions on the posterior surface of the tongue, especially in the region in front of the epiglottis. If morphin be given in advance and 1 per cent novocain solution used on the lingual nerves when the lesion is in the front of the tongue, and into the substance of the tongue itself when the lesion is on the posterior part of the tongue, the implantation can be carried out with very little discomfort to the patient. The aim of this treatment is to cure by a single application. It actually takes a number of weeks for complete regression and healing to take place. There is usually a good deal of pain and discomfort during this period, and the general health, nourishment and mouth toilet have to be most carefully attended to.

The principles involved in surface radiation are quite different. Here the widest surface distribution, the hardest gamma rays obtainable by metal filters and the arrangement of apparatus by increasing distances from the surface and multiplying surface portals are devices employed in securing a uniform radiation in the tissues by overcoming

the inverse square law which determines that the intensity of radiation decreases inversely with the square of the distance from its source.

In superficial lesions of the tongue there is an undoubted advantage in adding local surface treatment to the bare-tube technic.

In treating the glands of the neck the bare-tube method is more difficult of application, and undoubtedly it can be united with heavy surface treatments most advantageously. While absolute cure of gland metastasis by surface radiation must be very rare, nevertheless pronounced effects from this method alone have been observed in many cases.

In the treatment of certain radio-sensible sarcomas, notably lymphosarcoma, the employment of radium is more like a specific drug or serum. This is not the case in tongue cancer; here radium methods are completely analogous to surgical methods; that is, the radium must be used in a way that will bring intense radiation to all tissues affected or likely to be affected by the cancer, but must spare surrounding undiseased normal tissues. This means a great precision of application.

For advance in radium results there still remains a number of fundamental problems unsolved. The actual determination of dosage given by the burying method as compared to external application is not as yet worked out. The effects on tissue of different intensities of uniform hemogeneous radiation is but very imperfectly understood. The problems in connection with radiation demand the same kind of accurate study and planning and subsequent observation as do the problems arising in the consideration and carrying out of surgical treatments. We doubtless will finally talk of radiable and irradiable tongue cancer cases as we now speak of operable and inoperable.

Combinations of Treatments. In the light of present knowledge it seems to me to be logical to remove surgically the small lesions on the tip and side of the tongue. It is permissible to give as a preliminary, or after the removal,

radium treatment to ensure further against local recurrence. In small growths on the floor of the mouth, on the back of the tongue or involving the tonsil, reliance should be placed in radium, and the operative procedure limited to tissue removal for diagnosis. In large growths, local in the tongue and requiring for even a hope of cure complete surgical removal, radium should always be used.

The treatment of the regional lymph gland territory and neck is not quite so definite. As already suggested, a systematic block dissection where there are no palpable glands ought to be done in enough cases and by enough men to allow of a real assessment as to the value of this procedure. In another group systematic thoroughly planned and accurately recorded radiation by both the external and burying technics should be done and the results determined. It is obvious that these two methods can be combined.

When there are definitely involved but movable glands, these should be surgically removed. Radiation as a preliminary and following such a removal is theoretically good practice. Whether there is any advantage in implanting at the time of operation seems questionable. Thorough removal of not only the involved gland but of all the associated gland territories seems to me the wisest procedure as a routine. Exceptions undoubtedly to this general rule will have to be made in patients who are bad surgical risks.

In patients where complete removal of the glands is obviously or even probably impossible, I believe that better results can be hoped for by radiation alone. The entire volume of neck tissue involved must be studied, considered and treated as already indicated for the tongue. I should like to say here that the technic which will ultimately be developed is probably very different from that which has been described. It is desirable in large masses to employ much larger units of volume and stronger emanation tubes.

PRIMARY CARCINOMA OF THE FEMALE BLADDER, WITH REPORT OF A CASE

By I. S. Stone, M.D.
Washington, D. C.

The object of this paper is to report a case in which early excision of a supposedly malignant bladder tumor, by combined vaginal and abdominal operation, has resulted in an apparent cure.

This subject appears to have been given rather scant attention in the literature. We find but little definite or specific description of the disease, its frequency, prognosis or results of special operative treatment in female patients.

Relative Frequency in Male and Female Patients. Albarran[1] gives the proportion as 14 to 20 per cent in women and 80 to 86 per cent in men; while Winckel[2] reported 37 cases, 33 of which were in women, or eight times as many as in men. These statistics are, of course, unreliable, having been published several years ago.

We have seen many cases of cancer of the bladder associated with cancer of the uterus, but only two of which were primary as far as we could discover. Allowance must be made for those cases seen in ward practice too late for accurate observation. By most of my associates, cancer of the bladder has been considered hopeless from the start. My belief now is that this is wrong and that the present-day efficiency in diagnosis and careful study will change this gloomy outlook to a more hopeful promise. One of the

[1] Quoted by Watson and Cunningham.
[2] Quoted by Mundé.

most disappointing features of case reports in the literature is the lack of a follow-up study of cases. Certainly there is no substantial progress possible until we know more than the immediate result of treatment.

Case Report. Miss ———, white, aged fifty-three years, single and virgin, came to see me in February, 1920, on account of irritable bladder with bloody urine. She had always been healthy since childhood, weighed 150 pounds, had the appearance of good circumstances and had no vices. At the time of her visit she was passing bloody urine every day, which she thought was uninfluenced by exercise. After she came under observation we always found blood in specimens examined microscopically. She had not had any severe or alarming hemorrhage at any time. Blood examination showed 80 per cent, hemoglobin and no constitutional disease, with blood-pressure 130 systolic. Her urine was normal apart from the usual epithelium, shreds and elements from the growth in the bladder. Pelvic examination gave but little information. It was discovered that she always had residual urine in her bladder, generally about two or three ounces. With a Kelly cystoscope, a mass near the left ureteral orifice could be seen which had a ragged surface and was dark red in color, which easily accounted for the bloody urine and irritable bladder. She had not suffered severe pain, but was obliged to empty her bladder at intervals of a few hours. This circumstance I now believe was partly due to the inability to completely empty the organ. (Incidentally, her bladder capacity was somewhat limited, being about ten ounces.) My colleague, Dr. G. Brown Miller, examined the patient at my request and gave an unqualified opinion that we had to deal with a malignant growth. He advised operative treatment.

The growth, as seen through the cystoscope, appeared to be about two centimeters vertically and not as wide as

it was long. It was placed immediately adjoining the felt ureteral orifice, being rather more above than below that point. The outline was in sharp contrast to the adjoining mucosa, being abruptly projected out from the bladder wall, which was practically of normal appearance. The growth was sessile and answers well to the description of papillomatous carcinoma.

Preliminary Treatment. In order to sterilize the mucosa as well as possible a 2 per cent solution of protargol was thrown into the bladder on alternate days for a time, the same treatment as that used in cystitis. It was seen that distention of the organ beyond a certain point always caused pain and increased bloody return.

Operation. The first steps of the operation were rather tedious, owing to the small size of the vagina. However, the anterior vaginal wall was opened in the median line and the bladder carefully and thoroughly separated from all attachments at its base, especially on the left of the median line and from the anterior surface of the uterus, an easy matter to those accustomed to the performance of vaginal hysterectomy or an interposition operation. The region about the ureter was thus investigated, the growth located, and its size estimated. Then the abdomen was opened and the operation completed from above. I wish particularly to call attention to the ease with which the operation was completed after the base of the bladder was freed. We could raise the organ considerably above its usual position and there was no special delay in the excision of the growth, as the ureter was easily brought into view. In this case the ureter was displaced slightly but not entirely separated from its lateral attachments, and was sutured in position as the wound was closed. A line of small plain catgut sutures closed the bladder and were tied on the inside. A second row of No. 2 catgut was added on the outside but under the peritoneal cover. A drain tube provided with fenestra was sutured to the anterior wall of the uterus and

brought into the vagina to act in case of leakage, possible infection, or hemorrhage. As a matter of fact, there was need of this which we did not expect, for a small amount of urine escaped through it for more than a week. A self-retaining catheter was placed in the bladder. Although this catheter was doubtless retained within the bladder, it is almost a certainty that its lumen was allowed to get closed and the leakage due to that mishap. However, there was at no time any serious delay in the patient's recovery. Complete and satisfactory wound closure proceeded rapidly and without infection. The bladder functionated satisfactorily in ten days.

The wound in the bladder extended from the apex to a point well below the left ureteral orifice and the growth excised with scissors, leaving a good margin of healthy tissue outside of the involved area. The pathologist of the hospital reported an epithelioma, and I regret that the specimen has been lost. No treatment was required for cystitis, and although the patient has been kept under observation for more than a year, no untoward symptom has occurred. The growth had involved the musculature of the bladder, but there was no evidence that the disease had extended outside. This, however, may have been due to the absence of lymphatics in the region of the ureteral orifice.

At my request the patient came to my office December 5, 1921. She reported herself well and we found her bladder in excellent condition, although she was still unable to completely empty it voluntarily before examination. She has gained in weight and feels confident that she is permanently cured.

The description of operations for cancer upon the female bladder by the surgeons named below will prove interesting, the more so because they comprise about all of the special work of gynecological operators in this field.

In several reports of removal of the uterus and resection of

the bladder for cancer it would seem difficult to determine if these merit classification with the rest, as they must have been secondary rather than primary carcinomata.

References

Pawlik: Verhandl. d. X., Internat. Med. Cong., 1890, Berlin, 1891, cxi, 8, Abst., 101–106; describes the first cystectomy upon a female patient for cancer of the bladder. He first sutured the ureters in the vagina, and at a second operation a month later, removed the bladder. The operation was performed in 1887. A year later, he says, the patient made a long journey to Berlin, spent the day in seeing the great city and was apparently enjoying life.

Munde, P. F.: Am. Jour. Obst., N. Y., 1886, xix, p. 267, describes what appears to have been the first reported case in America.

Martin, F. H.: Am. Jour., Obst. and Gyn. Chicago, May, 1900, xvi, 395.

Mann, M. D.: Am. Jour. Obst., N. Y., 1906, 263.

Reynolds, E.: Interstate Med. Jour., St. Louis, 1914, xxi, Extirpation by Way of the Vagina.

Webster, J. C.: Am. Jour. Obst., N. Y., 1905, lii, p. 873.

Boldt, H. J.: Am. Jour. Obst., N. Y, 1906, 263.

DISCUSSION ON THE PAPERS OF DRS. HORSLEY, BURNAM AND STONE

Dr. Henry O. Marcy, Boston, Mass.—It might be well to begin the discussion on these excellent papers by giving you briefly my earlier experiences.

In 1870, I was a student of the distinguished Dr. Bennett, of Edinburgh. Up to that time it was generally taught over the Continent that cancer was a constitutional disease and that it did not matter whether you operated or not you could not cure the disease, although you might do good in comforting the patient. Bennett said that his experience showed that if we operated on cancer early we could cure a large number of patients. I became convinced that the position he took was a wise one, and from that time I began to practice surgery, and as you know I have operated a great many times for cancer in different parts of the body and the primary or local results have been very encouraging. The whole secret of the business to the surgeon is to operate on cancer as early as possible.

My friend Dr. Carstens, of Detroit, Mich., who died a few months ago of cancer of the mediastinum, was the first man I knew who insisted that we physicians should teach the public not to keep away from the profession but to come early for examination regarding any questionable condition. Dr. Carstens advocated that we should have one day a year, to be known as cancer day, and that it should be understood as a duty of the profession to teach their patients as carefully as they could the possibilities of the return of cancer after its local removal.

I have had many cases of permanent cure from cancer. Only a few days ago I saw a patient on whom I operated twenty-seven years ago for the removal of the breast for cancer, and she has remained well since. That is simply one illustration of many cases I could relate if time permitted.

I should like to speak for a moment in reference to radium. I have had no personal experience with its use. My friend Dr. Kelly has been enthusiastic about the use of radium, and at first he thought he had solved the problem of the cure of cancer by radium. He spent $100,000 of his own money in order to obtain radium in quantity. A friend of mine gave him $100,000 more for this purpose. I have sent many patients with cancer to Dr. Kelly for treatment by radium. I have been unsettled in regard to my experience with radium, and I presume one of the reasons was we sent patients to the radium hospital or clinic after we had exhausted our own efforts in trying to relieve or cure them by other measures. It is very gratifying to me to have heard this morning what can be accomplished by the judicious application of radium in the treatment of cancer when used at an early period.

What I want to emphasize particularly is the importance of teaching the public in regard to cancer, and it was only two weeks ago that we had in Boston a cancer convention, insisting that women should come and hear what was said. A woman came to me directly after the convention with a small local cancer. She did not think it amounted to much, but after hearing that discussion she came to me. Needless to say, Dr. Marcy operated on her.

Dr. John M. T. Finney, Baltimore, Md.—In regard to Dr. Horsley's paper, I am not quite prepared to accept one point that he made, namely, that it is a good plan to do a plastic immediately after the operation. Personally I have

seen enough cases of recurrence of cancer following the most radical removal to make me feel that it is safer to wait a while before doing a plastic.

I want to speak more particularly with reference to Dr. Burnam's excellent presentation. I have done my last complete removal of the tongue. I can recall with misgivings and some humiliation a considerable number of complete removals of the tongue for cancer that I have done in years past. Most of them fortunately died promptly of pneumonia —a happy relief. One of them lived for a considerable number of years—I cannot recall the exact length of time. In that case I made a complete removal of the tongue down to the epiglottis. The floor of the mouth and lower jaw were all involved, so that I took them all out by block dissection on both sides. Strange to say the man survived and lived for many years. If one looked into his mouth one could see little but the epiglottis. He always carried a stomach tube in his hat. He was not very exemplary in his habits. He told me that whenever he got thirsty and went into a saloon he would attract the attention of the men at the bar by taking the tube out of his hat and calling for a drink. He would then proceed to insert the tube and pour in the drink. This performance usually excited so much interest on the part of those in the saloon that they invariably would insist on treating him, so that it cost him little or no money to get a good supply. He finally died of recurrent carcinoma.

I want to raise the question of the significant leukoplakia. Dr. Burnam referred to the precancerous stage. I should like an expression of opinion of the individual members of the Association as to how they feel toward leukoplakia as a precancerous condition. This question was raised recently in an interesting way. I received a letter from the chief physician of one of the large metropolitan life insurance companies in New York saying that a certain patient of mine, whom I had treated years ago, had a leukoplakia and that he (the patient) wanted to take out a large life insurance policy. This physician wanted to know whether I would advise the acceptance of such a policy when the patient seemed to be otherwise all right. I answered that I would not accept him if it were up to me to decide. He replied that, curiously enough, so far as he could find out, life insurance companies had paid no attention whatever to leukoplakia.

I have had the opportunity to see with Dr. Burnam several cases of advanced cancer of the tongue that were treated by radium with far better results than one could reasonably expect from surgery. In early cases I have removed the original growth and followed it up by radium, and the results have been far better than I had been able to achieve by surgery alone.

Dr. William D. Haggard, Nashville, Tenn.—I can give Dr. Finney a little comfort by referring to a case I saw recently in which he removed half of the tongue fourteen years ago. That man is still alive and was well up until recently, when, curiously enough, he had a new growth on the opposite side near the epiglottis and in the tonsil, quite apart from the original lesion from which he had been well for fourteen years.

If the theory of local irritation counts for much it would mean that ingestion, salivation and the swallowing of everything has been directed over the remaining half of the tongue and the local traumas have given rise to the small recurrence which we were able to demonstrate microscopically and have clinically and temporarily relieved with radium.

I was pleased to hear Dr. Burnam say that in the early lesions in the front of the tongue and on the side of the tongue surgical removal was still very satisfactory. I can recall several cases in which we destroyed the growth by the actual cautery and the patients are now alive and free from recurrence for periods of over five years. In the early cases Dr. Burnam's contention can be amply sustained by my own clinical experience.

Dr. Francis R. Hagner, Washington, D. C.—I have been very much interested in these three papers and in the cases reported, particularly the one by Dr. Stone. We know very well that probably there is no form of cancer that is more refractory to treatment, except cancer of the prostate, than cancer of the bladder, and the percentage of recurrences is very great. I cannot help but feel that one of our weak points is the traumatism we inflict in our dissection of the growth during removal, and we should do everything in the operative procedure in these cases to eliminate this. A pad soaked in alcohol and packed around the bladder wound, with the hope of destroying any cancer cells that may become loose, is an advantage.

About eight years ago I reported before this Association 3 cases of cancer of the bladder in which the growth was located in the top of the bladder. The bladder is filled with water, a good exposure of the bladder is made, then a cystoscope is introduced to accurately locate the growth. By this aid two sutures are placed through the bladder wall at the margin of the growth. Thus we are enabled to open the bladder without cutting into the tumor and clamp off the portion to be removed in the lateral wall and top of the bladder.

I have those specimens here today. The first case was operated on in 1910, and that man was well eleven years afterward. In the second case this large tumor involved the top of the bladder here (indicating). This man was sixty-five years old and was operated on in 1910, eleven years ago. He is at present in good health with no evidence of recurrence.

The third case was operated on in January, 1911, lived two years and died of pneumonia with no local recurrence.

I have had some experience with radium in growths in the bladder. We have had a few cases, in which the disease was apparently malignant, where the patients refused operation and have gotten well under the use of radium applied to the growth.

I feel from what we know of radium at the present time that in many of the larger growths where it is impossible, except by a complete removal of the bladder, to get rid of the growth we are justified in going in and taking out as much as we possibly can and following it up with the use of radium.

In some of the large tumors, such as carcinoma of the vulva, radium has had no effect whatever. In these cases a large part of the growth should be removed surgically followed by the use of radium. In such cases radium does seem to do good and will add to the remarkable results where the great mass is removed surgically first.

Dr. Hermann J. Boldt, New York City.—I have listened with a great deal of pleasure particularly to that part of the discussion pertaining to carcinoma of the tongue, for the reason that a number of years ago one of my personal friends was to have been operated upon for carcinoma of the tongue. A diagnosis was made supposedly from the result of a microscopic examination. Two different surgeons told him he had carcinoma of the tongue and proposed operating upon him. My

friend saw a dermatologist who gave him some intravenous injections of salvarsan and the tongue cleared up rapidly. As a matter of fact I know of some three or four instances, to my personal knowledge, where a diagnosis had been made of malignant disease of the tongue, whereas the disease turned out otherwise than malignant.

I know of one instance in which Dr. William H. Welch saved a patient's future by differing from another pathologist. That patient is well.

One word in regard to primary carcinoma of the bladder. I do not know what the opinion of the general surgeon is who does a great deal of bladder work, but Dr. Squier, of New York City, told me yesterday that he has had a fair percentage of absolute cures in cases of carcinoma of the bladder, and he does quite a large number of operations.

A good many years ago I had the opportunity to operate upon a case of primary carcinoma of the bladder, and I was enabled to keep the patient under observation for a period of three years. What became of her since then I do not know, but she remained cured up until the last time I saw her.

It seems to me, from what I have learned from personal experience and from others regarding operation for carcinoma of the bladder, if it is done sufficiently early we are likely to get a fair percentage of permanent cures.

Dr. John H. Gibbon, Philadelphia, Pa.—From what has been said it seems to me there are two outstanding features with regard to cardinoma of the tongue which will apply to cancer of the buccal mucous membrane anywhere. They are the unsatisfactory results we have had from surgical treatment and the better results we have had from the use of radium.

There is one thing we probably all agree upon, and that is in cancer of the tongue and in cancer of the mucous membrane of the mouth the determining or active cause is local irritation, thermal, mechanical or chemical, and therefore it seems to me, what we want to emphasize to the profession and to the public is the one fact that an absolutely clean mouth, one not damaged by any of those three forms of irritation, is not apt to be the seat of malignant disease.

It has been my experience that the recurrences are often due to the same thing which determines the original growth—irritation. If we do not see that the teeth are properly taken

care of and the use of tobacco is stopped and allow our patients to go on with foul mouths after operation, they will get prompt recurrences. The one thing that we as a profession should emphasize on all occasions to the public is that a foul mouth or irritation is apt to be the determining cause of cancer.

Dr. Horsley (closing the discussion on his part).—I inferred from the remarks of Dr. Finney that I must have failed to bring out what was the real object of my paper, that is, the principle of transferring to the wound made by excising the basal-cell cancer the raw surface of a tissue from a distance from the cancer. The cosmetic results are not considered in such an operation. This principle is founded on the fact that even in extensive basal-cell cancers, in which radium and other things have failed to cure, the growth does not extend more than about a half-inch from the margins of the cancer; whereas, spinous-cell cancers of the face metastasize in the neck and in the chest rather early.

A flap transplanted at a distance from the original basal-cell cancer seems to carry some of the resistance of the tissues to basal-cell cancer. The resistance in the immediate neighborhood of the cancer appears to be broken down by some product of metabolism which is probably created with the growth of the cancer. This resistance appears to be restored in part at least by the transferrence of flaps from a distance.

In the 2 cases which I reported, roentgen ray, radium and operations had been used without a cure. In the first case cauterization and the transferrence of flaps from a distance seems to have cured the cancer. In the second case it was impossible to approximate all of the raw surface of the flap to the wound left by excision of the cancer. There were several recurrences, and each recurrence occurred where the raw surface of the flap had not grown to the wound left by excision of the cancer. In no instance was there any recurrence where the raw surface of the transplanted flap had grown to the wound left by the excision of the cancer. These facts, taken in connection with the peculiar pathology of basal-cell cancer, are, to say the least, highly suggestive.

Dr. Stone (closing on his part).—My object was not so much to report the results of a single operation as to encourage men who have only had one or two cases to report them, and especially to describe their method of operating.

The most striking thing in looking up the literature was to find so few cases in which operation has been done early when patients were not beyond hope of recovery.

I found that Pawlio, in 1888, was the first to operate on a woman for primary carcinoma of the bladder. The literature is insignificant and I hope the members will report every case.

Dr. Burnam (closing the discussion).—There is very little that I can add to what I have already said in regard to my own paper.

I should like to say a word about Dr. Horsley's paper. One of the cases he reports I believe I was treating with radium. We have basal-cell epitheliomas around the mucocutaneous junctions and in the mastoid region that show a remarkable tendency to recur after healing from radiation. Many of these patients come to the condition in which fulguration or cautery destruction brings about an easy cure which would be impossible without the preliminary radiation. As a matter of fact I did not turn the man down as a hopeless case for radium; he simply left me and I lost sight of him.

Dr. Horsley has brought out two important facts, one of which is that there is a change in the tissue around a basal-cell epithelioma which seems to devitalize it and lower its resistance. This tissue is not only more subject to growth, but also to all kinds of infections and ulcerations than normal tissue. The second principle that he has brought out, and which is little known, is the importance of the transplantation of flaps from a remote part of the body. I feel that this is a great help in the restoration in these cases.

In many epitheliomas about the nose and mouth and in the mastoid region it is possible, however, to get a complete healing from radiation, to preserve the normal features and avoid the mutilation which follows the extensive cautery destructions.

I am not prepared to pass on the technic as to the best method of flap transplantation. I do believe, however, that before any flap closure is undertaken a long interval of perfect healing should have intervened after the treatment, whatever it may be, for the cancer has been given.

PERIOSTEAL SARCOMA IN ASSOCIATION WITH OSTEOMYELITIS: REPORT OF THREE CASES

By R. L. Rhodes, M.D.
Augusta, Ga.

When Dr. Bloodgood, after receipt and study of material from the first case, wrote that he had "never observed sarcoma in osteomyelitis," it occurred to me that it would be of sufficient interest to report. A second case, a few months later, emphasized this, and, finally, a third case since the title of the paper was sent to our Secretary. I wish simply to record the clinical observation and to show the roentgen-ray pictures of the cases.

Case I.—University Hospital, No. 19647. Admitted July 21, 1920. Miss C., white, aged fourteen years. Sarcoma, periosteal, large round cell, alveolar, left tibia, osteomyelitis. Onset six weeks before admission with pain in the left knee and leg. Swelling developed just below the knee in a few days and was lanced, but nothing obtained, though roentgen ray had shown an osteomyelitis of the upper end of the tibia. Examination on admission to the hospital showed a slight swelling about the knee and the leg a trifle warmer than the right. There was a wound, covered by a dry scab, 1 cm. long, on the anterior surface just below the knee. The surrounding skin was red for about 1 cm., and the region sensitive upon pressure, lessening as one gets farther away, but extends up to the head of the tibia and down about midway of the leg. No fluid in the

knee. Motions of the leg are a little painful. No history of trauma, of typhoid fever or any other serious illness. Her temperature did not exceed 99.3°; pulse rate, 125 to 150. Urine showed albumin, a few waxy and hyaline casts, and a few red blood cells. Leukocyte count, 16,500; Wassermann negative. Roentgen ray report, July 25, 1920: Upper end of left tibia shows osteomyelitis with destruction of cortex of bone anteriorly.

Operation, July 29, 1920: Dr. J. H. Kite, resident surgeon. Removal of entire anterior half of the tibia from just below the upper epiphysis down to midway of the leg. Pathologic report of material removed was osteomyelitis with Staphylococcus aureus in pure culture. Operation was followed by Carrel-Dakin treatment. Progress was apparently uneventful except the pulse rate remained high and granulation tissue grew very fast, so that it was frequently cauterized with silver nitrate. After six weeks (September 11, 1920) the granulation tissue was so abundant that it was removed with a curette down to the bone, the upper end of which was also curetted. Following this the temperature rose to 102° daily and the pulse still rapid. She began to grow weaker, anemic and coagulation time increased to ten minutes, tested because the dressings were associated with rather free bleeding. Two weeks later the granulation tissue was again overabundant, and I was asked by the resident surgeon to see her. Roentgen ray showed a large amount of bony production invading the soft tissues around the upper end of the tibia and seemed to be out of proportion to the amount of callus that would be expected, and sarcoma was strongly suggested. Roentgen ray of the lungs was negative. A section was taken from the depth of the wound, but showed only infected granulation tissue. This was repeated with the same findings. The general condition of the patient was poor; she was anemic and weak; leukocyte count, 3200; red blood cells, 2,640,000, and hemoglobin, 35 per cent. We so

strongly suspected sarcoma, even though the sections failed to show it, that I decided to explore, and this was done October 5, 1920. A tourniquet was placed just above the knee to prevent dissemination of sarcoma cells, if found. An enormous bulging overgrowth of granulation tissue was removed with the fingers and curette down to the bone. There were many slender striæ of bone formation, perpendicular to the shaft, through this, but the sarcomatous tissue was not encountered until the wound had been opened to the posterior mesial aspect of the tibia, where it was found in abundance. Fresh operative toilet (gowns, gloves, instruments and dressings) was promptly made, an additional tourniquet placed high upon the thigh and a mid-thigh-amputation done between the tourniquets.

Pathologic report, by Dr. R. V. Lamar: "Large round-cell sarcoma, apparently arising from the periosteum of the upper portion of the tibia and invading muscles and connective tissue (not the bone) upward into the popliteal space; extensive hemorrhage; some necrosis; widespread infection (Staphylococcus aureus) of the soft parts. Also osteomyelitis of the tibia way down the shaft below the limit of the tumor. Staphylococcus here also."

The immediate convalescence was satisfactory, with marked improvement in the general condition, and she was discharged from the hospital on the twelfth day.

Four months later there was a questionable infiltration of the left lung, which was definite after a lapse of two months more—thus roentgen ray, April 15, 1921: "Areas of density in the left base and right upper portion of lower (left) lobe, at least suggestive of recurrence of sarcoma in lungs." She escaped from our observation after this and the next we heard was of her death, August 12, 1921, ten months after amputation, thirteen months after first symptom. The family, upon interview, gave a history of her last illness, which indicated that in all probability it was pulmonary metastasis.

Case II.—Wilhenford Hospital, No. 7392. Admitted, March 15, 1921. Miss S., white, aged twelve years. Sarcoma, periosteal origin, large round cell, left tibia. Family and past history negative, except for three miscarriages by her mother. She first noticed "growing pains" in the left tibia during February, 1920. Swelling appeared about July 1, 1920, and following this she began to have attacks of "hard pains" in the leg with drawing of the toes, duration two or three days. Some relief was obtained by hot moist applications. No loss of function except during the attacks. No history of trauma or of any serious illness. She was given antisyphilitic treatment with a presumptive diagnosis of syphilitic periostitis from July, 1920, until early in January, 1921. During the latter part of January she developed gonorrhœa, for which she was treated by Dr. F. X. Mulherin, with whom I saw her in consultation relative to the leg about March 1, 1921. Blood Wassermann was negative; leukocytes, 13,000, and hemoglobin, 60 per cent. Chest negative. Examination of the leg as noted below, except that the growth was not quite so large; its progress had been very slow. It was diagnosed as probable sarcoma, and careful study of a roentgen ray taken in December rather confirmed this opinion, and operation was advised. They procrastinated, however, until several days before admission to the hospital, when there was a rather sudden and rapid increase in size which served to hasten her to the hospital.

Examination, March 16, 1921: There is a fusiform swelling of the left tibia, mid and upper thirds, the largest diameter, two inches, at about the junction of these thirds. No tenderness; no loss of function; no involvement of knee or other joint; no elevation of surface temperature. It is quite indurated and apparently covered with bone. No pulsation. General examination otherwise negative. Roentgen ray at this time, taken in the University Hospital, was reported as probable sarcoma of periosteal origin.

There were two superimposed layers of bone (?) above the shaft with fine striæ of bone formation perpendicular to the shaft. Roentgen ray of the chest was negative. No other bones taken.

Operation, March 19, 1921: A tourniquet was placed just above the knee, the tumor explored and found to be sarcoma, verified by frozen section. Fresh operative toilet and a midthigh amputation done without removing the lower tourniquet. Convalescence was uneventful and she was discharged three weeks later.

Specimen: The tibia was dissected out and the growth found to be fusiform, extending entirely around the tibia, but thinnest on the posterior aspect. It was apparently perfectly encapsulated, with no invasion into the surrounding tissues or into the bone; seemed rather to be superimposed upon the shaft of the tibia. Upon splitting it a small abscess was found in the medullary cavity with early necrosis of the canal midway the length of the tumor and Staphylococcus aureus infection.

Subsequent history to date is uneventful; no evidence of recurrence local or otherwise. She has grown rapidly and added considerable weight.

Case III.—University Hospital, No. 23341. Admitted, August 3, 1921. Julia M., negro, aged twenty years. Sarcoma, periosteal, large round cell. Family and past history negative; no serious illness. Present illness began three months ago as a small lump on the anterior surface about midway in the left tibia. Growth gradual for two months but quite rapid during the past month, and she has had to use a strong stick in walking. Following the use of hot applications to try to lessen the swelling, it became ulcerated. She has never had any pain. Loss of weight has been rapid during the past month. Never any trauma.

Examination negative except as follows: The left inguinal glands and those in Scarpa's triangle were a trifle enlarged.

There was a fusiform swelling of the middle third of the left leg, about three times the size of the right. The toes were dropped and the foot somewhat inverted, and a small ulcerated area over the anterior surface of the tumor. Some elevation of surface temperature, but no tenderness upon palpation or manipulation; the latter reveals false motion in the region of the tumor. The growth is soft and nowhere suggests bony covering. Temperature upon admission was 102° and showed a daily range from 100° to 104°; the pulse rate, 110 to 135. Urine, blood and blood Wassermann were negative; hemoglobin, 90 per cent.

Roentgen ray August 4, 1921, reported: "Osteosarcoma invading the middle portion of the left tibia. Fracture, transverse of the left fibula at the junction of the mid and lower thirds with callus formation and angulation." A small section was taken from the ulcerated area, which was immediately cauterized with the electrocautery; this was reported as sarcoma.

Operation, August 5, 1921: Dr. G. N. Coker, resident surgeon. Midthigh amputation. Convalescence uneventful except for a low-grade wound infection with Bacillus pyocyaneus. She was discharged September 15, wound healed and general condition good. Temperature dropped to normal immediately after operation, the pulse rate more slowly.

Pathologic report, Dr. R. V. Lamar: "Large round-cell sarcoma, apparently of periosteal origin, and beginning at about the junction of the mid and lower thirds of the left tibia mesially, invading the bone and leading to fracture, and invading much more of the soft tissues, extending out to the skin with ulceration, infection and sloughing: down to the inner malleolus and upward to above the middle of the tibia. Many mitotic figures. Much fine intercellular lime deposit with very early formation of new bone extending perpendicularly." The lower portion of the tibia showed dense infiltration downward about two inches, and below

this the growth extended subperiosteally to the lower border of the internal malleolus. The tibia above the fracture showed extensive necrosis and infection (Staphylococcus aureus). The fibula was not invaded and the site of fracture seemed to be healing with normal callus. Recent interview and examination shows her still in apparently good condition.

SUMMARY. (1) Three cases of large round-cell sarcoma, periosteal origin, associated with infection and necrosis of bone. (2) All females—two white, one negro. (3) Ages fourteen, twelve and twenty years, respectively. (4) Left tibia in each case. (5) No history of trauma or serious illness. (6) Local pain in two; none in the other. (7) Staphylococcus aureus infection in each. (8) Rapid pulse and rather high fever in two; none in the other. (9) Treatment, midthigh amputations. (10) Results: one dead and two living free from signs of recurrence, local or elsewhere, to date.

DISCUSSION.

DR. EDWARD H. OCHSNER, Chicago, Ill.—For twenty years I have been using Coley's serum in the diagnosis of sarcoma. The essayist did not mention it, and I find that while Dr. Coley first mentioned its use in this connection the medical profession in general does not seem to know about the use of Coley's serum in the differential diagnosis between sarcoma, tuberculosis, osteomyelitis, chondroma and osteochondroma. This is one of its most valuable uses. If the injection of Coley's serum in reasonable doses does not produce a rise in temperature I think one can exclude sarcoma with reasonable certainty. I have found this use of Coley's serum very valuable, and because of the fact that it has not been recognized generally I thought others might be glad to know about it.

DUODENAL DIVERTICULA, WITH THE REPORT OF FOUR CASES

By William A. Downes, M.D.
New York

It is probably true that the majority of duodenal diverticula give rise to few if any symptoms, and may be looked upon as unusual findings of little clinical significance, encountered in the routine roentgenologic-examination of the intestinal tract. Yet it must be evident to every surgeon who has removed one or more of these diverticula that patients suffering from this condition are in constant danger. The walls of most of these pouches, especially if of any size, are composed only of mucous membrane with a thinned-out muscularis mucosa, which may or may not be covered by peritoneum, according to the location. That perforation does not occur more often is possibly due to the fact that most of them arise from the inner or posterior surface of the gut and are supported by the surrounding structures. There can be but little doubt that in most instances the anomaly is the result of a congenital defect, although a few cases are reported in which the sac formation has developed in the region of a healed ulcer, while still others give a history of trauma. The principal reasons for attributing these diverticula to congenital defects are: They have been found in infants; they may be multiple; and they are associated with similar changes in other parts of the alimentary tract. One of our cases showed one pouch in the lesser curvature of the stomach, two in the duodenum,

and several in the small intestine and colon. The fact that they may be located in any part of the gut-wall would indicate that weakened or deficient areas exist in the muscular coat at points other than those through which the vessels or ducts enter and emerge. Duodenal diverticula occur more frequently in women than in men. The average age in Case's series of 85 reported cases is given as fifty-six. No conclusion, however, can be drawn from these figures as to the probable duration of the symptoms prior to the time the patient consulted the roentgenologist. It would seem from the histories of our cases that they had developed to a sufficient extent to be of clinical importance at a much earlier period of life. That duodenal diverticula occur sufficiently frequent to be of more than passing interest is shown by the fact that roentgenologists of large experience report the incidence of the lesion as from 1 to 2 per cent.

The pathology of these diverticula is very much the same in nearly all of the reported cases. They are referred to as thin-walled sacs, pouched or loculated according to size, and are composed of mucosa and muscularis mucosa lined with a smooth epithelium which may show, as the result of distention, thinned-out areas, but not usually showing marked inflammatory changes. The muscular coat is practically absent in every specimen. The actual living pathology as seen at operation is very striking. After freeing the sac from the surrounding fat and areolar tissue it will stand out delimiting itself by the gas-pressure from within. As the dissection is continued down to the neck an actual fenestration may be observed in the muscle layer of the gut-wall. The arrangement of the structures is comparable to that of a true aneurysm in which the intima has herniated through the outer coats of the vessel. The location of the duodenum in relation to the stomach, gall-bladder and pancreas is such that it is not possible to attribute to this anomaly a characteristic group of symptoms. Apparently there is little discomfort of consequence associated

with the condition until the pouches reach considerable size, and then only when the neck is sufficiently narrow to cause retention. The resulting symptoms would logically be ascribed to the more usual diseases of the upper abdomen, and could be interpreted only in retrospect after the barium meal.

The first indication that the duodenum is the seat of diverticula may be shown by the development of symptoms of an obstructive nature. Those situated in the first portion may at times interfere with the proper emptying of the stomach; in the vicinity of the ampulla of Vater they may cause biliary obstruction by pressure on the common bile duct, while those near the duodenojejunal angle may give rise to serious symptoms from pressure in that region. If the pouches become inflamed or rupture from overdistention or the presence of a foreign body, the local or general symptoms usual to such accidents will be present. In the type in which the sac retains large quantities of chyme, as shown by the barium meal, there may be periodic intestinal attacks of a toxic nature. Our second case gave symptoms of this sort, while the third presented the typical picture of an attack of acute dilatation of the stomach. A large proportion of the reported cases of duodenal diverticula have been situated in the second or descending portion of the gut—in the vicinity of the ampulla of Vater; the next most common site is the first portion, and the least common the horizontal or third portion. All 4 cases herewith reported were located in the third portion.

The roentgen ray offers the only means for the diagnosis of duodenal diverticula, and too much credit cannot be given to roentgenologists for pointing out this lesion and insisting upon its surgical importance. To Case and Cole especial credit is due.

The ideal treatment is complete removal of the sac. As to whether this treatment should be advised in a given case, or whether it should be handled in a palliative or

expectant way, depends upon the symptoms and location of the pouch. In the cases giving symptoms, which with a fair degree of accuracy may be attributed to the diverticulum, operative treatment is indicated. Should the barium meal demonstrate the presence of a diverticulum in a patient suffering from chronic digestive disturbance, even if a definite lesion is found in the adjoining viscera, the diverticulum should be removed or infolded at the time the accompanying lesion is corrected, provided no distinct contraindication exists, such as inaccessibility of the sac or poor condition of the patient. In the type of diverticulum with a wide neck and without retention, as shown by the roentgen examination, in which the findings may be classed as accidental (provided no other lesion is present), the question of operation may be deferred, especially in the aged. As experience is gained in the operative management of this lesion, the natural anatomical difficulties encountered in exposing the sac will soon be met. The non-inflamed diverticula are not adherent, and with ordinary care can be easily dissected from the surrounding structures without difficulty or danger.

In 1 of our cases the pouch extended down beneath the mesenteric artery and vein, and in another, two pouches arising from the posterior surface of the third part of the duodenum extended to the right below and posterior to the head of the pancreas. All three were removed successfully. With the aid of the roentgenologist, not only the location of the neck but the course of the pouch can be determined with considerable accuracy. In order to locate diverticula situated behind the peritoneum it may be necessary to mobilize freely the descending as well as the transverse and terminal portions of the duodenum. The pouches arising from the anterior surface or lower border will come immediately into view, but those originating in the upper border or posterior surface may be difficult to locate. The presence of air in the sacs aids greatly in their recognition.

The operative procedure best suited for the relief of a given duodenal diverticulum will depend upon the size and location of the pouch. In those of small size, invagination is the easiest and safest method. The larger ones should be excised if possible. Should the lumen of the gut be narrowed to any extent by either of these procedures, gastroenterostomy should be added in the cases in which the diverticulum is situated in the first, second or proximal half of the third portions, and duodenojejunostomy if in the distal half of the third portion or in the vicinity of the duodenojejunal angle. In the cases with obstructive symptoms, either of the comon bile duct or gut, in which for one reason or another it is not possible to treat the sac directly, measures best suited to relieve the obstruction should be adopted. It may be necessary to drain the biliary tract by joining the gall-bladder to the stomach or intestine, or to unite the jejunum to the duodenum or stomach. In other words, proper drainage must be provided under any conditions. Fortunately the anatomical arrangement of the viscera in this region is such that this can usually be accomplished.

Four patients with diverticula of the duodenum have come under my care. In 3 the diagnosis was confirmed by operation. In each instance the lesion was situated in the third portion or at the duodenojejunal angle; in the fourth case the diagnosis was based upon the roentgen-ray findings only. The first patient was operated upon for a supposed penetrating duodenal ulcer, although duodenal diverticulum had been suggested by Dr. Le Wald, the roentgenologist. No ulcer was found. There was general enlargement of the retroperitoneal glands, one of which was removed, showing Hodgkin's disease. A search of the descending and transverse portions of the duodenum failed to explain the roentgen-ray findings, but upon exposing the gut at the duodenojejunal angle a diverticulum about 2 cm. in diameter was located arising from the upper posterior

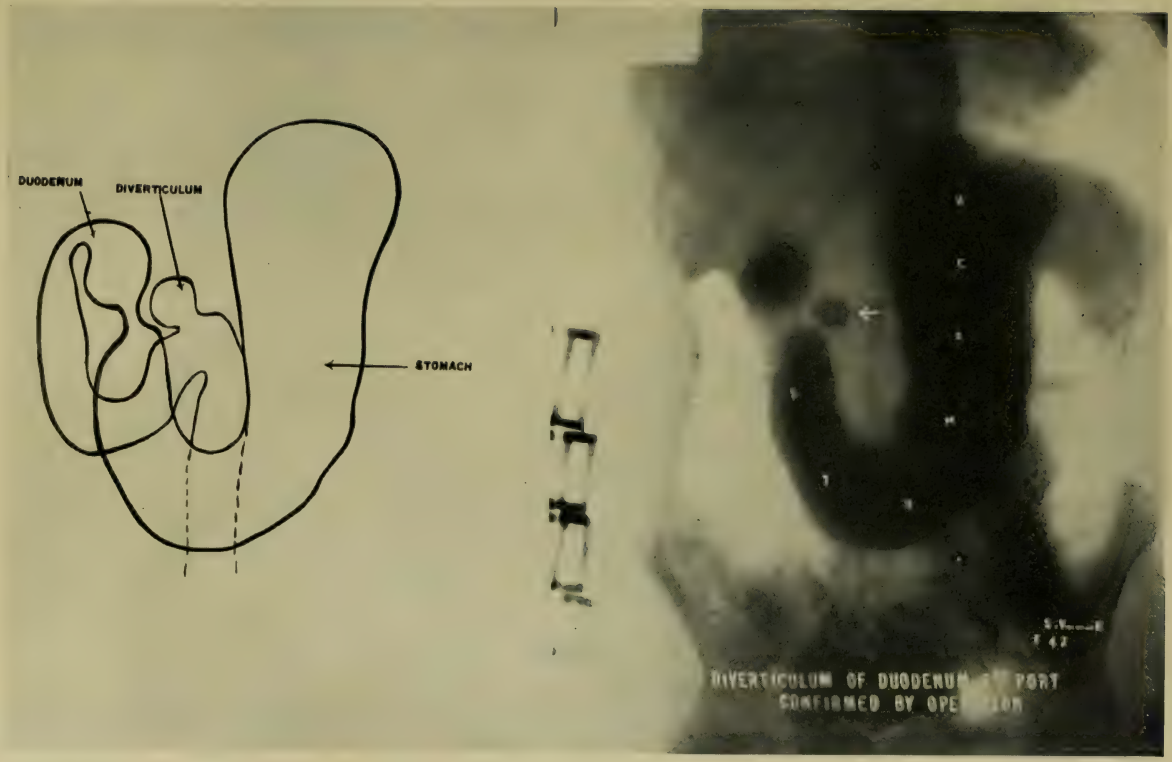


FIG. 1.—Case I. Diverticulum at duodeno-jejunal angle. Confirmed but not removed at operation.

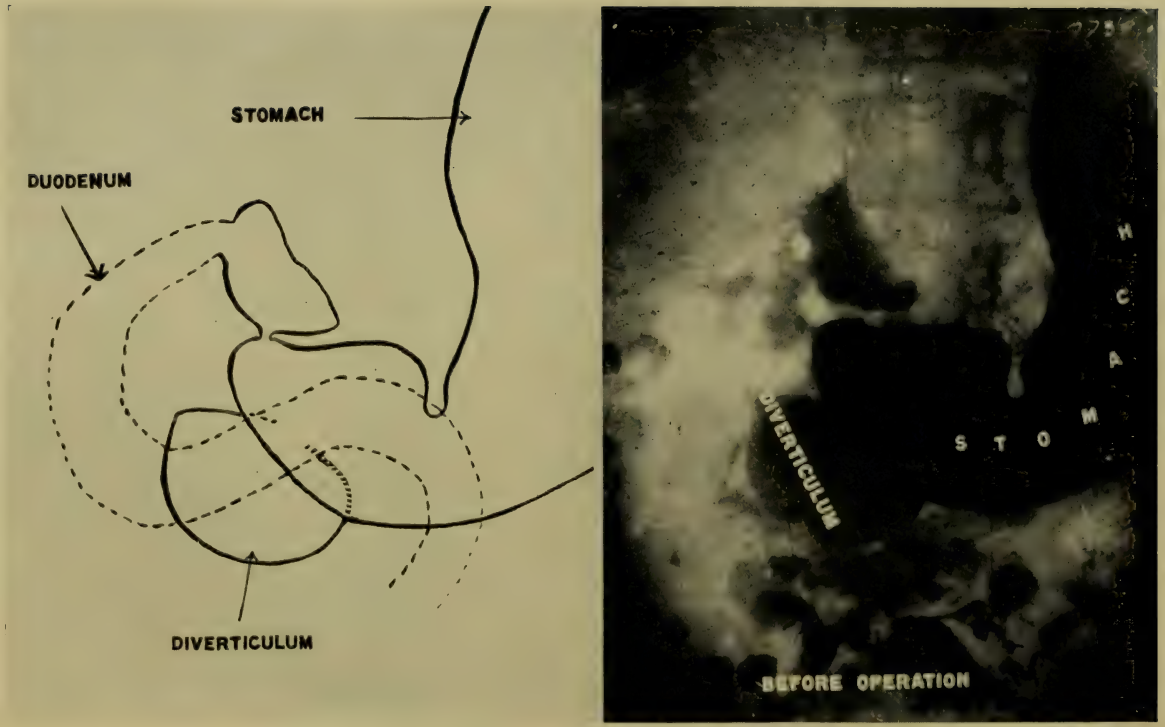


FIG. 2.—Case II. Large diverticulum, third portion of the duodenum. Removed at operation.

FIG. 3.—Case II. Diverticulum of duodenum. Seventy-two hours after bismuth meal. Colon injected.

FIG. 4. — Duodenal diverticulum, removed from Case II, July 18, 1921. (Slightly enlarged.)

Fig. 5.—Case II. Three months after operation.

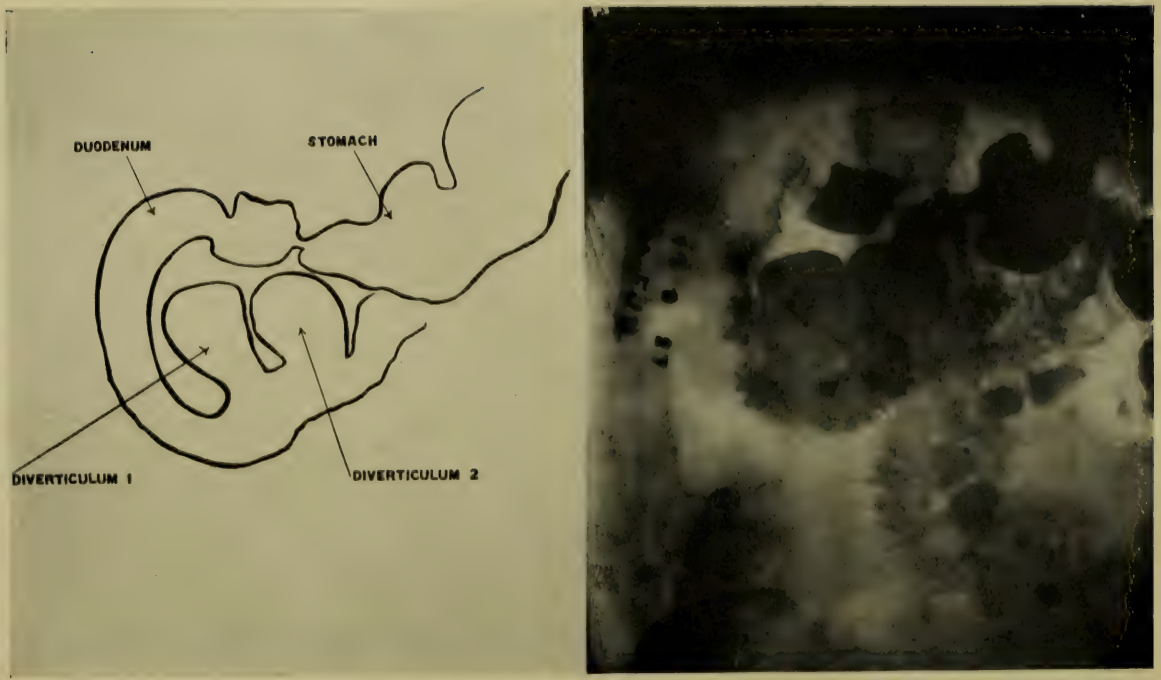


Fig. 6.—Case III. Diverticula (2) third portion of duodenum.

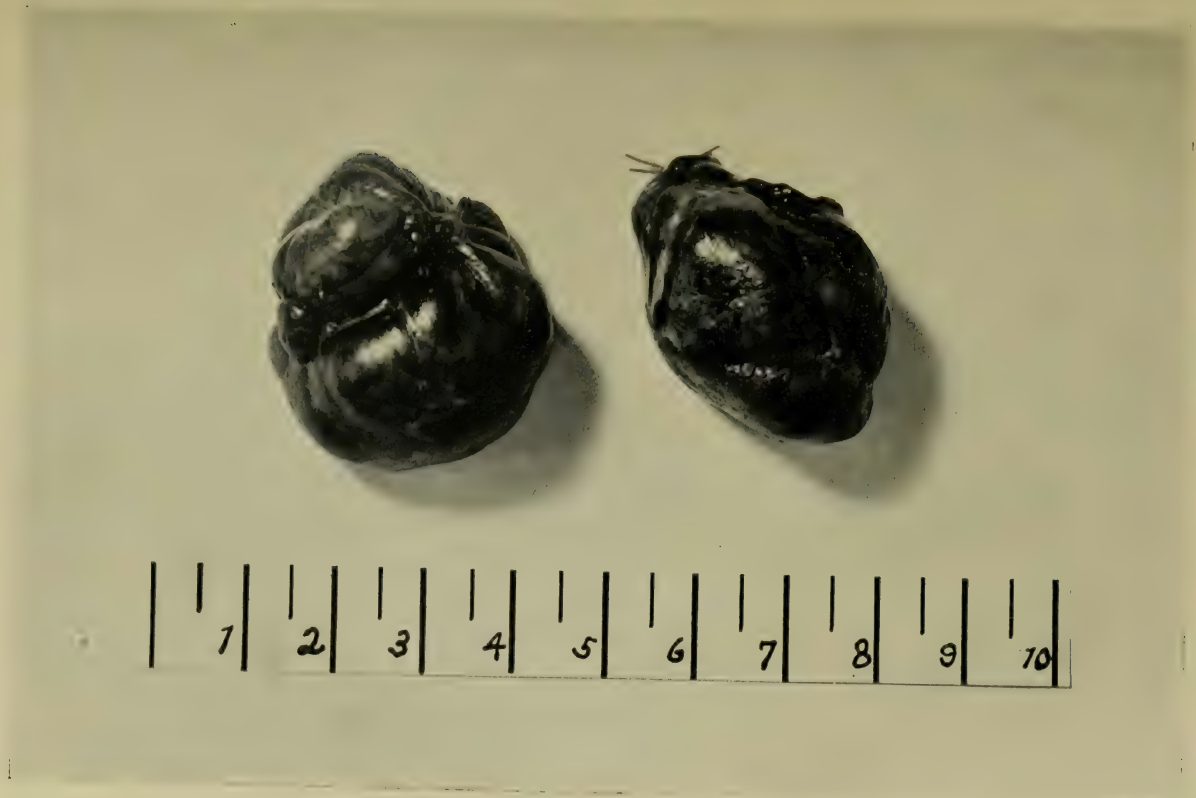


FIG. 7.—Duodenal diverticula. Removed from Case III, November 15, 1921.

Fig. 8.—Case III. Seventeen days after operation.

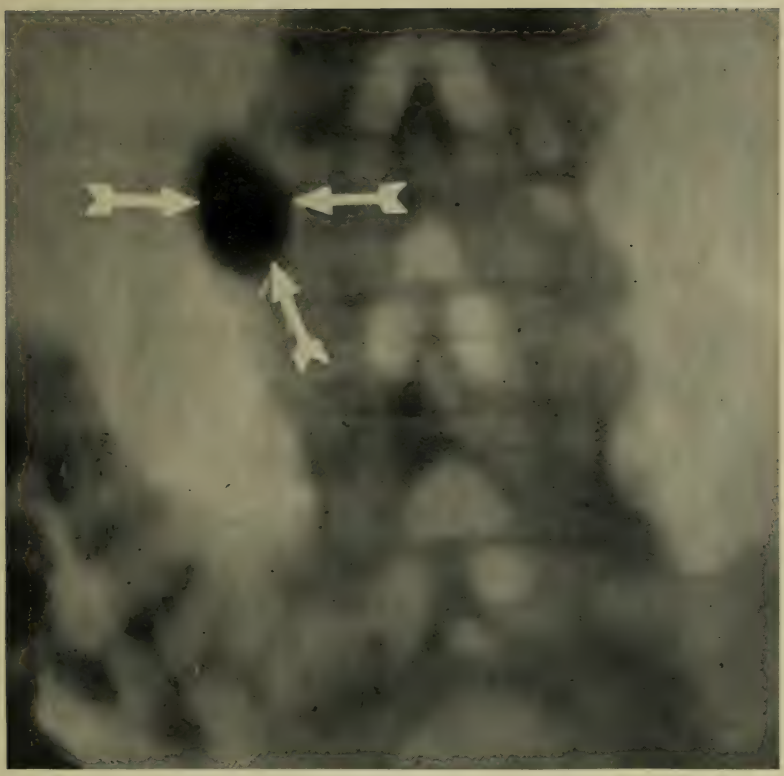


FIG. 9.—Case IV. Diverticulum, third portion, probably at duodenal-jejunal angle. Not confirmed at operation.

surface. No attempt was made to remove the pouch, as sufficient pathology to explain the patient's symptoms had already been found. The second case was diagnosed by Dr. Cole as a large diverticulum of the duodenum. The diagnosis was confirmed at operation, and a diverticulum 7 cm. in diameter was removed from the third portion of the gut. No other lesion was present. The symptoms in this case were those of chronic digestive disturbance with acute exacerbations. In the third case Dr. Imboden made a diagnosis of two diverticula arising from the transverse portion of the duodenum. He also found a single diverticulum high up in the lesser curvature of the stomach and multiple diverticula of the small and large intestines. The patient had suffered from a severe attack of obstruction high up in the intestinal tract. At operation two large diverticula were removed from the duodenum and the presence of diverticula in the small intestine confirmed. No exploration was made of the stomach. The fourth case was referred to the hospital for the relief of pain in the right side, with the suggestion that the appendix was the cause. Dr. Le Wald made the diagnosis of a diverticulum, probably located in the terminal portion. At operation the gall-bladder contained a number of gallstones. The gall-bladder and appendix were removed. A hurried examination failed to locate the diverticulum. As the patient was quite fat, and sufficient explanation for the symptoms had been found, it was not deemed wise to prolong the operation further.

Summary of Cases

Case I.—*Diverticulum of the Terminal Portion of the Duodenum; Confirmed at Operation; Not Removed.* S. V., female, aged forty-two years. Admitted to St. Luke's Hospital, March 18, 1920; transferred to Surgical Service, March 24, 1920; discharged, April 9, 1920.

Chief Complaint. Vomiting and soreness in region of stomach; duration six months.

Present Illness. Patient has had frequent attacks of vomiting, coming on from three to four weeks, for the past six months; no relation to eating. No sharp pain, but general soreness over the abdomen. Attacks usually last about one week. Appetite poor. Has lost weight and strength.

Past History. Three years ago patient was treated for Hodgkin's disease and apparently was much improved.

Family History. Negative.

Physical Examination. Poorly nourished woman; swarthy type, appearing chronically ill. Examination was negative, except for tenderness in the right upper quadrant and an enlarged gland in the right axilla.

Laboratory Findings. Red blood cells, 3,600,000; hemoglobin, 66 per cent; white blood cells, 22,300; morphology, normal.

Roentgen-ray Examination. (Dr. Le Wald): The stomach is markedly ptosed, "watertrap type." The first part of the duodenum is unusally high, extending up as far as the first lumbar vertebra. The greater curvature is four inches below the umbilicus. There is a peculiar shadow to the inner side of the pylorus, suggesting the possibility of diverticulum of the duodenum.

35 min.: The first and second part of the duodenum unusually prominent, suggesting the possibility of obstruction about the second portion.

5 hrs. 30 min.: The stomach is empty, also the duodenum, except for a shadow indicating retention in the diverticulum; confirmatory examination is advisable.

24 hrs.: Some of the meal has reached the sigmoid; traces of the meal remain as far back as the cecum; the diverticulum of the duodenum is evidenced by a collection of gas.

Operation. March 24, 1920. Preoperative diagnosis: Perforating duodenal ulcer; postoperative diagnosis: Diverticulum of the terminal duodenum; retroperitoneal Hodgkin's

disease. Operation, exploratory laparotomy; removal of glands for diagnosis.

Pathological Findings. Enlarged glands throughout gastrohepatic omentum and along mesenteric artery; stomach and duodenum—first and second portions normal; at the duodenojejunal junction a diverticulum was found, about 2 cm. in diameter, arising from the upper and posterior wall of the gut.

Operative Procedure. Upper right rectus incision; transverse and terminal portions of duodenum exposed by dividing transverse mesocolon; diverticulum isolated but not removed, as sufficient pathology had been found in the extensive glandular involvement to account for the symptoms; gland removed for diagnosis.

Pathological Report. Hodgkin's disease; mesenteric node. Recovery following operation uninterrupted. Discharged from hospital April 9, 1920. (This patient was readmitted to the medical service two months later, died in a few days of Hodgkin's disease; autopsy not obtained.)

Case II.—*Diverticulum of the Third Portion of the Duodenum; Excision.* F. S., female, aged fifty-three years. Admitted to St. Luke's Hospital, July 13, 1921; discharged, August 6, 1921.

Chief Complaint. Chronic intestinal disturbance.

Present Illness. Duration two years. Periodic attacks of abdominal pain and diarrhea lasting about one week, coming on about every two months; stools often contained mucus and blood. Attacks controlled by a restricted diet and large doses of bismuth. Dietary indiscretions seem to be the exciting cause of the attacks.

Past History. Negative except for nervous breakdown, two years ago, following first attack of diarrhea.

Physical Examination. Well-developed and well-nourished female. Slight rigidity over upper left quadrant of the abdomen; otherwise negative.

Roentgen-ray Examination (Dr. Cole). Type, orthotonic. Peristalsis, three-cycle, equal on the greater and lesser curvatures, unobstructed. Systole and diastole shown distinctly. Ileum, jejunum, duodenum and cap shown distinctly. Connected with the descending duodenum is a very large pouch, much larger than a hen's egg. This is observed during the early stages of digestion and also at two, six and twenty-four hours, and it is observed to be still filled with barium from the ingested barium meal three days after the administration of the meal, at the time the colon plates were made. It is approximately as well filled at this time as it is in any of the plates. This indicates that the opening of the pouch is upward and not downward. The rest of the duodenum is apparently normal. Cap normal and symmetrical, and corresponds with the pyloric end of the stomach. Sphincter normal. Pyloric end of stomach expands and contracts in a normal manner.

From a study of these plates I believe one is justified in making a negative diagnosis of cancer or ulcer of the stomach and a negative diagnosis of ulcer of the cap. There is evidence of gall-bladder adhesions involving the cap of upper part of the descending duodenum.

There is definite evidence of an immense duodenal diverticulum with its opening upward, which accounts for the prolonged retention of barium in this diverticulum. In spite of the fact that the stomach empties itself during the early stages of digestion, there is slight retention of barium up to twenty-four hours, and I believe that this retention is due to a regurgitation of the barium from the pouch into the stomach.

Operation. July 18, 1921. Preoperative diagnosis, diverticulum of the third portion of the duodenum. Postoperative diagnosis, same. Operation, removal of diverticulum.

Pathological Findings. In the third portion of the duodenum a diverticulum was located arising from the anterior wall, lying partly behind the mesenteric artery and vein.

After freeing the diverticulum is measured about two and one-half inches in diameter, base three-fourths inches. Walls very thin, apparently composed of mucous membrane only.

Operative Procedure. High right rectus incision; transverse mesocolon in the region of the third portion of the duodenum divided; diverticulum isolated; base clamped; diverticulum excised; opening in the mucous membrane closed by running purse-string of chromic gut, reinforced by two layers of chromic gut; wound closed without drainage.

Roentgen-ray Findings. Postoperative. (Dr. Cole.) November 12, 1921: A short series of the stomach, made immediately and two hours after the ingestion of a barium meal, shows the stomach to be of the same size, shape and position as it was at the previous examination.

The jejunum, duodenum and cap, and even the jejunoduodenal junction, are shown distinctly, much more than it was at the previous examination.

There is no deformity of the duodenum in the region from which the diverticulum was removed.

The cap, sphincter and stomach are normal.

At two hours the head of the column is in the terminal ileum.

Pathological Report. The specimen when received in the laboratory had been distended with fluid and photographed. It is a thin-walled, fluctuating sac, with coarse lobulations caused by fibrous bands constricting the surface, but not corresponding to any anatomical structures.

It measures 4 x 4 x 2.5 cm. in the greater diameters, resembling roughly a triangular pyramid in form. There is a line of over-and-over sutures at the pedicle, which now measure 3 x 0.5 cm. The remainder of the surface is smooth, covered with peritoneum and very delicate fibrous adhesions. The surface vessels are moderately injected.

On opening the sac the wall is found to be uniformly about

0.1 cm. in thickness, low ridges separating the lobules. The mucosa, which is greatly stretched and thinnned, shows a pale velvety surface with unbroken epithelium but no trace of the normal plicæ circulares, although some of the lobulations may have been found by them.

Microscopic sections were made from two areas. They show the same structure, consisting only of mucosa, including the smooth muscle fibers of the muscularis mucosæ and the peritoneum. The mucosa as a whole is thinned, due to the chronic distention and the villi correspondingly flattened, but the epithelium is fairly normal. No ducts of Brunner's glands are found, and, as the serosa is applied closely to the muscularis mucosa, none of the glands are seen. The deeper portion shows a slight catarrhal process, distention of the epithelial cells with mucus, and moderate infiltration of the stroma. Lymphoid nodules, normal in type, are present.

Convalescence Uneventful. Discharged from hospital, August 6, 1921. November 15, 1921. Patient in excellent condition and is free from symptoms.

Case III.—*Diverticulum* (2) *of the Third Portion of the Duodenum; Excision.* K. H., female, aged thirty-nine years. Admitted to St. Luke's Hospital, November 12, 1921; discharged, December 3, 1921.

Chief Complaint. Dull pain, upper abdomen, followed by nausea and vomiting.

Present Illness. Eight weeks ago noticed dull pain in the middle of abdomen. This pain gradually increased and was of a spasmodic nature. Attacks coming on every few hours. Forty-eight hours after onset became nauseated and vomited; general abdominal tenderness and distention. This attack of pain continued for eight days and was finally relieved by washing out the stomach. During the attack there was no fever, jaundice or urinary disturbance. Since the attack subsided has felt as well as

before attack, except for localized tenderness in the region of the umbilicus.

Past History. Married, four children, no miscarriages. About seven years ago had several mild attacks similar to the recent one; otherwise negative.

Physical Examination. Well-developed, well-nourished woman. There is a slight tenderness in epigastric region, most marked in the ensiform of the middle line. Considerable gurgling in this region, apparently due to distended viscera; otherwise negative.

Laboratory Findings. Red blood cells, 4, 900,000; hemoglobin, 105 per cent; white blood cells, 10,800; polymorphonuclears, 60; neutrophiles, 39; eosinophils, 1.

Roentgen-ray Examination. (Dr. Imboden.) Diverticulum of the cardiac end of the stomach; diverticula (2) in the course of the ascending limb of the duodenum which retain the barium twenty-four hours; small diverticula in the course of the small intestine, ascending, transverse and descending colon.

Operation, November 15, 1921. Pre-anteoperative diagnosis diverticula of the third portion of the duodenum; postoperative diagnosis; same.

Pathological Findings. Stomach, gall-bladder, first and second portions of duodenum normal. Two diverticula—one about one and one-half inches, the other about one inch in diameter and about two inches long—were found arising from the posterior surface of the third part of the duodenum. These diverticula extended to the right, behind and below the head of the pancreas, and projected just beyond the right margin of the descending portion. Three diverticula were observed on the convex surface of the jejunum. No further exploration made of the intestinal tract. There was a thick peritoneal band, showing recent inflammation, about four inches in length and extending between the transverse colon and loop of the small intestine.

Operative Procedure. High middle-line incision. Trans-

verse mesocolon opened along the third portion of the duodenum and gurgling could be felt upon palpation, but no other evidence of the diverticula could be made out. The second portion of the duodenum was then freely mobilized. The tips of the two diverticula were then recognized and by gentle traction were drawn beneath the descending portion of the gut, and were found to arise from the ascending portion of the third part. The mouths of the diverticula were separated by about one-half inch of normal gut-wall; opening in mucous membrane closed by running purse-string of chromic gut; intestinal wall restored by double layer of chromic gut; peritoneum overlying duodenum approximated with fine gut; wound closed without drainage.

Pathological Report. Specimen consists of two diverticula from the duodenum. They have been sutured along the cut edges and partially distended with fluid, thus forming two irregular ovoid pouches, one measuring 3.8 x 3 x 3.5 cm., the other 4 x 3.5 x 3 cm. The smaller has the most regular outline, the large presenting a few coarse lobulations. Both are covered externally with delicate fascial layers. The walls are paperlike in thinness and in some areas almost transparent. One section they show only faintly the flattened and atrophic remains of the plicæ circulares. The lining is finely granular and appears to consist of mucosa only.

Sections of the walls taken from several different areas show that it is composed exclusively of mucosa, being limited on its outer surface by the fibers of the muscularis mucosæ. These muscle fibers are relatively normal, but the remainder of the mucosa is thin and strophic, the villi are much lower and more widely separated than normal, and no ducts of Brünner's glands can be found. The epithelium is considerably desquamated from the tops of the villi and the surface covered with a layer of cellular debris and mucus. The tunica propria is hemorrhagic and edematous, the capillaries contain numerous poly-

nuclear cells, and these are also found in increased numbers in the stroma.

The entire mucosa is very much injected and penetrated by large thin-walled sinuses.

Roentgen-ray Examination, Postoperative, (Dr. Le Wald), December 1, 1921. Stomach: The greater curvature is about two inches below the umbilicus. The stomach is dilated and ptosed. There is a peculiar pouchlike appearance near the cardiac end of the stomach on the lesser curvature close to the region of the opening of the esophagus, apparently representing diverticulum of the stomach, in view of the fact that there are not active signs of ulcer, and no ulcer was found in the stomach at the time of the operation.

1 hr. 20 min.: There is still retention in the pouch at the cardiac end of the stomach. There does not appear to be any areas of retention about the duodenum, at this time, which would suggest diverticulum.

3 hrs. 15 min.: There is some of the meal in the stomach, with retention in the pouch at the cardiac end of the stomach, as previously described. There are also some rounded areas in the small intestine.

4 hrs. 45 min.: There is small retention in the stomach, with retention in the diverticulum at the cardiac end of the stomach. The coils of the ileum are prominent and are suggestive in places of adhesions. There is some delay in the ileum.

23 hrs.: Some of the meal has reached the rectum. There are traces as far back as the cecum.

28 hrs.: There is still retention in the diverticulum at the cardiac end of the stomach. Also, there is retention just to the right of the interval between the fourth and the fifth L. V., which represents diverticulum, possibly in the ileum. The cecum is ptosed.

46 hrs.: There is still retention just to the right of the interval between the fourth and the fifth L. V. Also, there is a small rounded shadow of opacity just internal to the

lower border of the right sacroiliac joint. Only faint traces of the meal remain throughout the colon.

Summary. Diverticulum of the cardiac end of the stomach; diverticula of the large intestine; colonic stasis.

Convalescence Uneventful. Discharged from the hospital, December 3, 1921.

Case IV.—*Diverticulum of the Third Portion of the Duodenum. Not Confirmed at Operation* (roentgen-ray diagnosis). A. Le D., female, aged thirty-four years. Admitted to St. Luke's Hospital, Medical Service, November 19, 1921. Transferred to Surgical Service, November 25, 1921. Discharged, December 11, 1921.

Chief Complaint. Pain in right side.

Present Illness. For many years attacks of pain and tenderness in the right side; no fever; no vomiting. About four weeks ago present attack became so bad had to remain in bed. Pain is greater when standing; appetite poor; always has pain in the back; no jaundice.

Past History. General health good except for the attacks of pain.

Physical Examination. A well-developed and well-nourished woman, not appearing ill otherwise negative, except for slight tenderness at McBurney's point. Meltzer's test positive.

Laboratory Findings. Negative throughout. Weight, 177 pounds.

Roentgen-ray Findings. Stomach: The greater curvature of the stomach is on a level with the umbilicus. No filling defect is observed in the stomach or duodenum. There appears to be some delay in the second portion of the duodenum, but this may be due to adhesions.

55 min.: The duodenal cap is well filled. The stomach is emptying at a fair rate.

4 hrs. 55 min.: There is a small retention in the stomach. The head of the column has reached the splenic flexure.

No definite delay in the ileum. There is retention in what appears to be the third portion of the duodenum, and is probably a diverticulum.

Summary. Duodenal diverticulum; seventy-two hours' retention in the appendix; colonic stasis.

Operation. November 25, 1921. Preoperative diagnosis: Chronic appendicitis; diverticulum of the duodenum. Postoperative diagnosis: Cholelithiasis; chronic appendicitis; diverticulum of the duodenum.

Operation. Appendectomy; cholecystectomy.

Pathological Findings. Gall-bladder somewhat contracted—contained numerous facetted stones; appendix kinked in proximal portion.

Operative Procedure. Upper right rectus incision; gall-bladder and appendix removed; transverse mesocolon divided over the third portion of the duodenum and a brief search made for the diverticulum shown in the roentgen-ray. As it was not readily found it was not deemed advisable to prolong the operation further.

Convalescence Uneventful. Discharged from the hospital, December 11, 1921.

MECKEL'S DIVERTICULUM

By Alexius McGlannan, M.D.
Baltimore, Md.

The relative frequency of the occurrence of Meckel's diverticulum is given by most authorities as between 1 and 2 per cent. Albers[1] puts it at 0.1 per cent. Coley and Fortune[2] say that "in 18,000 autopsy examinations of subjects who died of other trouble, 15 cases of Meckel's diverticulum were found." The true frequency is probably between these extremes, and the wide discrepancy may be explained by Mitchell's observation,[3] that its order of occurrence is quite inconstant—thus in 200 successive autopsies not one case was found, and then again its presence was noted in two successive cases.

Whatever difference of opinion may exist among anatomists as to the frequency of its occurrence, there is no doubt among surgeons as to the possibilities for danger existing in this fetal remnant.

Intussusception may be limited to an invagination of the diverticulum itself, or this invagination may be the starting-point for a complicated infolding of the bowel, extending well into the colon. With an umbilical fistula the intussusception may consist of invaginated bowel from above prolapsed through the fistula, or the infolding may be the result of a prolapse of the diverticulum through the fistula, dragging the ileum after it. In the former event feces will be discharged from the apex of the protrusion, while in the latter the feces will come from the groove behind the apex.[4]

Volvulus of the diverticulum alone, or with this structure as a starting point, a twist involving a loop of small intestine may lead to gangrene of the bowel. Acute inflammation of the diverticulum is likely to end in perforation and peritonitis. When attached to the umbilical scar the resulting band becomes the cause of certain cases of intestinal obstruction. When unattached the free end may become adherent to the mesentery, to the intestine or to the parietal peritoneum, and produce obstruction either as a constricting band about the bowel or by a kinking as a result of traction. If the diverticulum is long, and especially when the free end is knoblike, the tip is likely to loop itself around the remainder of the structure in such a way that a knot is formed. A segment of bowel falling into this knot will soon become obstructed and strangulated.[5]

Meckel's diverticulum may be the sole content of a hernia (Littre's hernia), or it may be present with other portions of the bowel. The diverticulum has been found in umbilical, inguinal and femoral hernias, strangulated or otherwise.

Alterations in the character of the attachment of the diverticulum to the intestine and to the umbilicus lead to the formation of various types of cystic tumors of the abdomen. A volvulus in which the twisting is not rapid or tight enough to cause gangrene may end in a cystic dilatation with a flat pedicle.[6] Benign and malignant tumors may develop in the wall of the diverticulum.

These menacing characteristics of Meckel's diverticulum amply justify Porter's advice that whenever one is observed during the course of an operation it should be removed if the condition of the patient will permit the additional manipulation.[7]

The following report gives my experience with Meckel's diverticulum. The 3 cases were observed in the course of nearly 1400 intraperitoneal operations performed during the past fifteen years.

Case I. — *Acute Diverticulitis.* The patient, a white female, aged eighteen years, was sent to the Mercy Hospital by Dr. Wilkinson on account of recurrent attacks of abdominal pain. The previous attacks had been diagnosed acute appendicitis. On admission the patient had colicky pain, with tenderness, muscle spasm and rigidity in the lower quadrant. On deep palpation a mass was felt at the edge of the rectus muscle, about two inches below the level of the umbilicus. The mass slipped under the fingers and this movement caused pain. A diagnosis was made of appendicitis with omental adhesions.

Operation, October 2, 1917 (McGlannan): Ether anesthesia. The abdomen was opened by a McBurney incision. The lower portion of the appendix was found edematous and the mesentery thickened. The appendix was removed. The mass at the edge of the rectus was hooked up by the finger and brought out through the wound. It proved an acutely inflamed gangrenous Meckel's diverticulum surrounded by adherent omentum. The attachment of the diverticulum to the convex border of the ileum was very small, not more than 3 mm. in diameter. It was situated about 40 cm. from the ileocecal valve. The attachment was divided between clamps, the stump ligated, disinfected and turned in by Lembert sutures. The healthy omentum was clamped around the mass, which was removed with the diverticulum. The abdomen was closed without drainage and the patient recovered.

The specimen (Fig. 1) consisted of the gangrenous diverticulum and the adherent mass of omentum. The wall of the diverticulum was soft and pulpy. The mucous membrane and musculature were almost entirely destroyed, leaving intact only the peritoneal coat.

While cases of acute diverticulitis are not common, several have been reported. Practically all of them have been diagnosed appendicitis before operation. In some of the earlier reports an attempt is made to outline symptoms

characteristic of disease of Meckel's diverticulum. At the present time, however, the opinion of those best fitted to judge is that, unless some anomaly of the umbilicus is present or is clearly indicated in the past history, it is impossible to distinguish between diverticulitis and appendicitis. In operating for acute appendicitis, when the appearance of the appendix does not explain the clinical symptoms a search should be made for a possible acute Meckel's diverticulitis.

Coincident acute appendicitis and perforation of Meckel's diverticulum have been reported.[8] Lehman[9] points out the similarity of etiological factors in acute diverticulitis and acute appendicitis. He calls especial attention to the importance of a narrowing of the outlet of the diverticulum and the consequent stasis within its lumen as a cause for the onset of an inflammatory process. The opening of the diverticulum into the bowel is generally wide. This fact may explain the relative infrequency of acute inflammation as compared with other lesions of the diverticulum.

Case. II.—*Femoral Hernia Containing Meckel's Diverticulum.* The patient, a white man, aged forty years, was sent to the Mercy Hospital by Dr. J. C. Lawson. He had a right femoral hernia, which was only partly reducible. It had been present three years. The patient's occupation required him to take long rides on horseback over rough country roads, and he attributed the hernia to this exertion. A truss had been worn but proved unsatisfactory, and the hernia became painful when he took a long ride. There had never been any symptoms of strangulation or of inflammation of the hernia.

Operation, March 4, 1920 (McGlannan): Procain infiltration. The hernia was exposed by an oblique incision. The bowel was adherent to the sac, and when separated it was found to be a blind pouch adherent by its free end to the sac. Traction on the pouch brought out a loop of

small intestine. The pouch proved a diverticulum arising from the convex border of the small intestine, and had a thin mesentery running up its side (Fig. 2).

The diverticulum was clamped at its junction to the ileum and removed. The intestinal wall was closed with catgut and linen sutures. The sac was excised after transfixion and ligation of its neck. The femoral canal was closed with a purse-string suture and the skin with interrupted stitches. The patient recovered without any complications.

The diverticulum was two and one-eighth inches long and three-eighths of an inch in diameter at its base. The tip had one small nodular projection. The mucous membrane and other coats were well developed and intact. Microscopically it showed all the structures found in the wall of the small intestine, including Lieberkühn's glands and a Peyer's patch.

Meckel's diverticulum has often been found as the contents of a hernia, either alone or with other structures, including the cecum and appendix. In about three-fourths of the reported cases the diverticulum is the sole occupant of the hernial sac, as it was in the case reported by Littre,[10] which gave his name to this type of hernia.

The proportion of inguinal to femoral hernias containing the diverticulum was about three to one in Pabst's[11] collection of 123 cases. The total number of strangulated hernias was 54, of which 35 contained the diverticulum alone. Strangulation occurred in 17 of 24 femoral and in 35 of 66 inguinal hernias. When the diverticulum was the sole content of the strangulated hernia the local signs were marked, while the symptoms of intestinal obstruction were mild or absent.

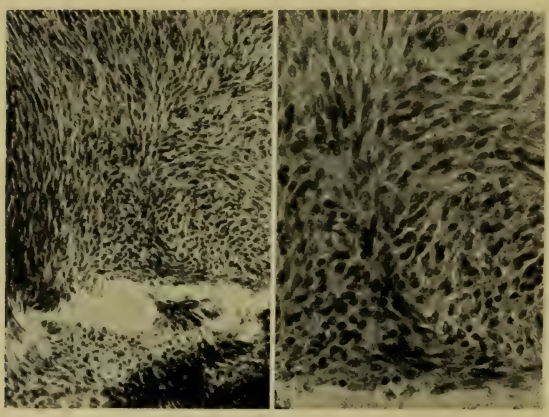
Case III.—*Large Cyst of Meckel's Diverticulum; Sarcoma of Cyst-wall.* The patient, a white man, aged fifty years, was sent to the Mercy Hospital, by Dr. McAvoy, on account of discomfort in his abdomen with progressive loss of weight

Fig. 1.—Acute diverticulitis. The gangrenous diverticulum is surrounded by an adherent mass of omentum. Note the narrow opening at the base of the diverticulum.

Fig. 2.—Meckel's diverticulum in the sac of a femoral hernia.

Fig. 3.—Cystic malignant myoma of Meckel's diverticulum. Outside view.

FIG. 4.—Cystic malignant myoma of Meckel's diverticulum. Inside view.



FIGS. 5 and 6.—Cystic malignant myoma of Meckel's diverticulum. Low and high power micrographs.

FIG. 7.—Strangulated intestine caught in the loop of a Meckel's diverticulum. (Cullen.)

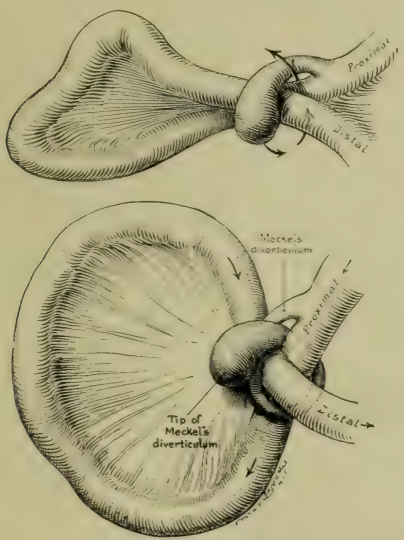


FIG. 8.—Diagram illustrating Figure 7. (Cullen.)

and vigor. He had a large nodular tumor occupying the lower hemisphere of the abdomen. The tumor was movable through a rather long up-and-down excursion. There was some pain in the right lower quadrant when the mass was manipulated. After study a diagnosis was made of tumor of a relaxed transverse colon or of the omentum.

Operation, November 3, 1917 (McGlannan): Ether anesthesia. A long incision was made through the inner border of the right rectus. When the peritoneum was opened a dark purple, cystic mass was exposed, filling the greater part of the abdominal cavity. There were a number of very large veins in the wall of the cyst and the omentum was adherent at several points on its circumference. At the upper pole of the cyst there was a loop of small intestine, apparently adherent to the growth. In exploring the attachments of the cyst it was ruptured and a large quantity of dark brown, bloody fluid was discharged. It was then lifted out of the abdomen and was found to be attached by a short pedicle to the small intestine about fourteen inches from the ileocecal valve. The wall of the cyst was continuous with the wall of the intestine through a pedicle about two inches long, which came off from the convex border of the bowel. The tumor was recognized as a development from a Meckel's diverticulum.

This pedicle was clamped and divided and the intestinal wall closed with catgut and linen sutures. The peritoneal cavity was mopped out and the pelvis drained. The treatment of peritonitis was begun at once, the patient being kept in the upright position and under the influence of opium. He was given salt solution subcutaneously and external heat applied to the abdomen. He died of peritonitis on the fifth day. Permission to make a postmortem examination was refused.

The tumor (Fig. 3) has the shape of a flattened globe. It is fifteen inches in its long diameter and eight inches in its short diameter. The wall is thin in most places, but

has a number of knoblike, yellowish-white areas which are thick and firm. These areas vary in diameter from one-fourth to two inches. On the inside of the cyst there is a rough, shaggy coat which in places has disappeared, leaving only a thin, translucent, peritoneal wall. Microscopic examination of a block taken from one of the knobby areas shows this tissue to be spindle-cell sarcoma (Figs. 4 and 5).

Cysts developed from Meckel's diverticulum are extremely rare. As far as I have been able to search the literature the only cyst of a diverticulum, as large as this one, that has ever been reported is Black's case, reported to this society at the Baltimore meeting.[12] In Black's case the diverticulum grew from the sigmoid. Symmers[13] reports a case of malignant myoma associated with Meckel's diverticulum and refers to Fried's report of a fibromyosarcoma and to Kaufman's report of a spindle-cell sarcoma, both tumors having their origin in the wall of a Meckel's diverticulum.

Through the courtesy of Dr. George A. Stewart I am able to add the following case:

CASE IV.—*Intestinal Obstruction due to Snaring of a Loop of Small Intestine in the Knot of a Free Meckel's Diverticulum.* The patient was a white man, aged forty-two years. The history previous to the attack of obstruction was negative and there was no umbilical deformity or discharge. The onset of the attack occurred at 1 A.M. with nausea and vomiting, quickly followed by abdominal pain. His bowels moved once, but this did not give him any relief from his pain. Twelve hours after the onset his abdomen was generally tender and distended. At the operation the gangrenous loops were resected and a lateral anastomosis done.

The specimen (Fig. 6) shows the distended gangrenous small intestine caught in the knot of the diverticulum, the end of which is bulbous. The mechanism of these knots and snares was worked out by Pavise and others

in 1845, and is illustrated in Treves's *Intestinal Obstruction,* page 50.

Among the congenital causes of intestinal obstruction, Meckel's diverticulum is generally accepted as the one most frequently present. In the series of 276 cases which I studied in 1915,[14] there were 9 instances where the diverticulum was recognized as the cause of the obstruction; 6 of the patients died and 3 recovered after operation. In 1 case the diverticulum was attached to the inner surface of the umbilicus by a cord; in the others it was free or had become adherent by its tip, or a cord, to the bowel or mesentery. The obstruction was caused by entanglement of a loop of intestine around the diverticulum, except in 1 case, where the adherent diverticulum kinked the bowel by traction. In none of the cases was there any umbilical deformity or discharge.

Bibliography

1. Quoted by Bunts, Annals of Surgery, xl, 539.
2. Annals of Surgery, May, 1921, lxxiii, 576.
3. Jour. Anat. and Phys., xxxii, 675.
4. Corner, Annals of Surgery, xxxv, 690.
5. Treves: Intestinal Obstruction, p. 50. Eisendrath, Annals of Surgery, l, 1278.
6. Cullen: The Umbilicus, p. 176.
7. Jour. Am. Med. Assn., September 23, 1905, xlv, 883.
8. Pearce: U. S. Naval Bulletin, July, 1919, xiii, 546.
9. Wiener klin. Wchnschr., September 30, 1920, xxxiii, 40, 884.
10. Mém. de l'Acad. de Sciences, 1700, p. 300.
11. Beiträge z. klin. Chirurg., 1910, lxix, p. 646.
12. Surg., Gynec. and Obst., May, 1919, xxviii, 473.
13. Annals of Surgery, August, 1919, lxx, 183.
14. Jour. Am. Med. Assn., August 21, 1915, lxv, 673.

DISCUSSION ON THE PAPERS OF DRS. DOWNES AND McGLANNAN

Dr. Thomas S. Cullen, Baltimore, Md.—I have been very much interested in diverticulitis of the sigmoid flexure. My attention was first drawn to this group of cases early in February, 1904, when I saw a patient, aged sixty years, who for some time had complained of slight difficulty in defecation and who for a few days before I saw her had been running a temperature from 100° to 103°

On vaginal examination I found the uterus somewhat enlarged. Posterior to it and apparently continuous with it was a globular mass. This was very hard and resembled a myoma in contour. There was, however, a hard ridge over its lower portion, as is so often noted where a pelvic abscess exists.

I made a small incision just back of the cervix and obtained a little pus from the cul-de-sac, but the mass still persisted. The abdomen was opened, the rectal growth removed and an end-to-end anastomosis made. The descending colon was brought up and fastened in the left inguinal region, to be opened if distention developed later. It was opened on the fourth day. The patient made a very satisfactory recovery. The case was reported in full and illustrated the same year.[1]

I did not see another case of diverticulitis for several years and then operated on 4 within a year. One of these was almost moribund when admitted to the hospital. He died a few hours later. The other 3 recovered. In none of the 4 was any attempt made to remove the growth. The abscess was wiped out and drained.

In August, 1921, Dr. Brice W. Goldsborough, of Cambridge, Md., was visiting Dr. Howard A. Kelly at his camp in Ontario. They took a thirty-mile canoe trip and Dr. Goldsborough was taken with excruciating abdominal pain that night. Dr. Kelly on the following day had to paddle him many miles in a canoe, then transported him over a primitive lumbermen's railroad for several miles. The last stretch of the trip was made in a baggage car.

His abdomen was at once opened and Dr. Kelly found a rectal growth which looked like cancer. The growth was

[1] Cullen, Thomas S.: A Series of Mistaken Gynecologic Diagnoses, Jour. Am. Med. Assn., August 22, 1904.

short-circuited, a lateral anastomosis being made. The patient speedily recovered and rapidly gained in weight.

A few weeks ago Dr. Kelly again opened the abdomen. The growth had diminished in size and was easily removed without in any way disturbing the anastomosis. The cut ends of the gut were turned in and the abdomen closed. The patient is now in excellent health. The growth was a diverticulum of the sigmoid.

Dr. James E. Thompson, Galveston, Texas.—I have listened to these papers with a good deal of pleasure and profit. The paper of Dr. McGlannan is extremely instructive. In cases of acute intestinal obstruction we never fail to think of a Meckel's diverticulum as a possible cause. It must always be a matter of guesswork because an exact diagnosis can never be made. A systematic search of the lower two or three feet of the ileum will show more cases of this condition than one would expect. During an operation on a patient whose symptoms pointed to repeated attacks of appendical colic I found a normal appendix. Careful examination showed a free nonpathologic diverticulum arising from the ileum about twelve inches from the cecum. The real pathology was a band formed by an obliterated right hypogastric artery arising from the lower end of the common iliac which passed as a free band across the peritoneal cavity to the anterior abdominal wall about two inches below and to the right of the umbilicus. Removal of this band was followed by complete disappearance of all the symptoms.

Dr. Downes's paper was unusually interesting. I hope his published paper will contain a full account of the symptomatology. Unless the symptoms warrant interference I should consider operation uncalled for and rather dangerous. These diverticula are met with quite frequently in dissecting-room subjects, and as far as one can judge they are nonpathologic. In one of Dr. Downes's pictures a diverticulum was shown close to the jejunal junction. The superior mesenteric artery was shown in close proximity to the cyst, so close that it might easily have been wounded. One dreads to think of such a catastrophe.

Dr. Dean Lewis, Chicago, Ill.—I have operated upon but 1 case of duodenal diverticulum. This diverticulum was incidentally discovered during an exploratory laparotomy.

This patient has suffered for a year with severe pain which at times resembled the pain of gallstones. A definite localized tenderness was found in the right hypochondrium. The diverticulum occurred on the anterior wall of the duodenum, just to the duodenal side of the pylorus. The opening in the duodenal wall through which the mucosa herniated would admit the end of my little finger. A continuous peritoneal covering was present. The pain was undoubtedly caused by the diverticulum, for it subsided as soon as the diverticulum was invaginated and has not recurred.

Dr. William Perrin Nicolson, Atlanta, Ga.—I have operated on 4 cases of Meckel's diverticulum. Years ago I reported in the *Transactions* of this Association a case of acute diverticulitis, a beautiful specimen of jet-black diverticulum about one inch wide and four inches long. In 1 case of diverticulitis there was a persistent band from the diverticulum which extended up to the umbilicus, wrapped around fifteen inches of the small intestine, requiring resection. It was supposed to be a case of acute appendicitis. I have seen 2 cases of Meckel's diverticulum in children in which there was invagination into the cecum, causing an immense intussusception. The Meckel's diverticulum seemed to be the starting-point and in each case became invaginated and passed into the ileocecal valve. I have never seen a case of Meckel's diverticulum that was not pathologic, but the mere fact that I should have 4 of these cases seems to show that the condition is not so rare as one would expect.

Dr. William T. Black, Memphis, Tenn.—I have had the opportunity of seeing 4 cases of diverticula and 3 of them were Meckel's. Two of these cases produced intestinal obstruction and 1 of the other 2 cases had a benign growth springing from the end of Meckel's diverticulum about the size of a walnut. These cases show the importance of exploring thoroughly that portion of the ileum near the ileocecal valve in all cases in which we are operating for right-sided abdominal pain which is not demonstrated by the presence of appendicitis.

The fourth case referred to by Dr. McGlannan I reported at the Baltimore session of this Association. In this case the tumor was the size of a nine months' pregnancy and sprang from the tip end of a diverticulum. This diverticulum was

evidently of the acquired form. The tumor was attached to the tip end of the diverticulum, which came from the sigmoid region. The only other attachment was an inflammatory one to the right of the umbilicus upon the abdominal parietal peritoneum on this side.

Dr. Randolph Winslow, Baltimore, Md.—I have seen a number of cases of Meckel's diverticulum and have operated on several. One case I recall in particular was where a mass formed in the right side at apparently the site of the appendix. An exploration was made and it was found to be a conglomeration consisting of the appendix, the right Fallopian tube and a Meckel's diverticulum massed together. I removed them and the patient made a satisfactory recovery.

I have seen also another case in which there was an intussusception, due to the Meckel's diverticulum in a child, such as the preceding speaker mentioned. When I have come across Meckel's diverticula in the course of operations I have removed them.

We have had in Baltimore a number of cases in people who have died from Meckel's diverticulum from strangulation or gangrene of it, so that I regard Meckel's diverticulum as one of the most dangerous pieces of abdominal anatomy a person can have. My impression is that it occurs about 1 in 50 cases, and probably there are one or two persons in this room now who have a Meckel's diverticulum.

Dr. Cullen spoke of pathologic conditions about the umbilicus, and from the appearance of the chart I should say the patient may have a Meckel's diverticulum. It certainly is a dangerous piece of vestigial anatomy, and if in the course of an operation you find Meckel's diverticulum I think the proper procedure is to remove it.

Dr. F. W. Parham, New Orleans, La.—I desire to mention an interesting case that came under my observation some years ago: The patient was a young man, eighteen years of age, who had suffered for a number of years from attacks of recurrent colic simulating an incomplete obstruction. From his history I made up my mind that there was probably incomplete obstruction, but there was nothing to indicate where the obstruction was nor what the nature of it was. Between attacks he seemed quite comfortable. When I opened the abdo-

men after making a diligent search I found a Meckel's diverticulum as large as the thumb and from its tip a small round cord ran upward to the umbilicus. It appeared to be the remains of the omphalomesenteric duct. I cut this away completely, ablated the diverticulum and tucked it in with Lembert sutures. The boy made an uneventful recovery and has never had any symptoms since, so far as I have been able to learn. The partial obstruction was caused by the kinking of the intestine over this cord, although no actual obstruction was found during the exploration.

I report this interesting case as emphasizing the necessity of making in all of these cases with colic and the signs of obstruction a careful search of the abdomen, and I believe it is always a good idea in operating in the region of the appendix to pull up the ileum until a sufficient quantity of it has been pulled up to disclose the usual site of these Meckel's diverticula.

Dr. Ernst Jonas, St. Louis. Mo.—I should like to mention a case of Meckel's diverticulum in connection with *situs viscerum inversus*. Some years ago Dr. Tuholski operated on a case of large abscess in the left iliac fossa. The case was drained and at the second operation a gangrenous Meckel's diverticulum was removed. This case is so unique that I thought it would be interesting to put it on record.

Dr. J. A. Crisler, Memphis, Tenn.—In Dr. McGlannan's paper he mentions the herniation of Meckel's diverticulum. I think it would be difficult to establish the fact that it was the Meckel's diverticulum that had herniated into the femoral opening. It is likewise difficult to determine just how many Meckel's diverticula have been strangulated in the hernial opening. The histology of both is about the same and Meckel's diverticulum would naturally be considered as a congenital condition.

I have had 2 cases in which there were herniation and diverticulation of a portion of the gut. The gut wall would come down like this (illustrating on blackboard) and a portion of it was caught in the hernia; the other portion refused to go in and there was partial obstruction but not a complete obstruction. Although it was on the small intestine it was not a hernia of Meckel's diverticulum.

Dr. Frank D. Smythe, Memphis, Tenn.—I wish to report a case which is germane to the subject presented by the essayist, though, like Dr. Crisler, I am of the opinion that a large number of cases spoken of as Meckel's diverticula are not Meckel's diverticula but diverticula such as Dr. Downes referred to in his paper this morning.

My case was that of a boy, aged fourteen years, who had suffered for six months with intense pain in the umbilical region. The pain occurred daily, and generally in the afternoon. The history of the case was that the lad until he was twelve years of age enjoyed good health. Six months ago he fell from a tree to the ground, a distance of about twelve feet, with the result that he was unconscious for a short while. Apparently he was suffering but little after he regained consciousness. Some weeks after the fall he was kicked in the umbilical region by a mule. Since he received the blow from the animal's hoof he has suffered very much pain but not before 1 or 2 o'clock P.M. The pain continues with increasing severity until modified by an opiate. He has steadily lost strength and flesh and is at present pale and anemic, with an anxious expression upon his face. Upon admission into the hospital he was suffering intense pain; his pulse was quick and he had slight elevation of temperature. Upon physical examination a mass was detected situated to the left of the umbilicus. It was tender upon pressure, hard and smooth, and my first opinion was that I was dealing with a sarcoma, probably of the sheath of the left rectus muscle. There was no history of blood or pus having been discharged from the bowels.

A series of roentgen-ray pictures was made of the gastro-intestinal tract. After the lapse of thirty-six hours the gastro-intestinal tract was completely empty of the barium which had been administered, with the exception of a small amount located to the left of the umbilicus. (Illustrating on the blackboard the exact location of the mass). It was about the middle of the left rectus muscle.

At operation an incision was made to the outer side of the left rectus and it was found that the small intestine and a portion of the omentum were adherent to the peritoneum, and a knuckle of the gut or diverticulum was incarcerated and strangulated in the belly of the rectus muscle (indicating its location and appearance by a drawing upon the blackboard)

—Littre's hernia. At the top of the projection, or diverticulum, was a small perforation, and there was considerable fecal matter, mucus and some pus filling a cavity about the size of an English walnut; around the cavity the tissues were indurated, hard and unyielding upon pressure. The mass could not be completely removed without resection of a portion of the muscle. The diverticulum was disengaged and removed from the small intestines and resection of the gut was not necessary. I regret that I have not the specimen with me. It is a very rare and interesting one. The boy made a rapid and complete recovery and rapidly regained his strength and weight. There was no trouble experienced in getting him off the opiate after the removal of the cause that produced the severe pain from which he suffered.

Dr. Hermann J. Boldt, New York City.—Reference has been made twice in the discussion with regard to invagination of these diverticula. A great many years ago I made it a rule to invaginate the stump of the appendix in all cases of pelvic operations until I heard on one occasion where such an invaginated appendix underwent cystic degeneration in the bowel, causing so much trouble that the abdomen had to be opened and the appendix removed. So I would call attention to the fact that it might be dangerous to invariably follow the rule of invaginating rather than excising diverticulum.

Dr. Downes (closing the discussion on his part).—In the first sentence in my paper I stated that the great majority of these duodenal diverticula gave rise to no symptoms, and naturally in that type of case one would not think of advising operation.

In our first case we had a patient who had suffered from periodic attacks of intestinal disturbance and we found a large diverticulum which was removed last June. That patient is now absolutely free from intestinal symptoms. After looking at the specimen grossly it can be appreciated that to have ignored it would have been a serious error.

In the second case the symptoms were precipitated by the sudden onset of what appeared to be an acute dilatation of the stomach. The patient became acutely ill and was only relieved by lavage. The symptoms were serious by the time I saw the patient. We took roentgen-ray pictures and found these two diverticula. That patient has been relieved since.

So far as the danger of removing these diverticula is concerned I think that with care they can be drawn up as easily as an esophageal diverticulum, and, as a rule, they are not adherent to any of the surrounding structures. We found it was easy to pull the sac up without danger of wounding the vessels.

As I understand the case reported by Dr. Lewis the diverticulum came off the outer side of the first portion and it was an easy matter to invaginate. In the larger diverticula it seems to me wise to excise them and restore the gut wall by suturing transversely or doing whatever operation seems to be necessary. The small diverticula have been ignored. In the 2 cases in which there were accidental findings in my series the spleen was removed in one and the gall-bladder in the other. The condition is a real one which we should bear in mind. In obscure jaundiced cases in which patients are not relieved by the usual procedures we may find on investigation a small diverticulum which displaces the common duct and causes obstructive symptoms. In all these cases of unrelieved jaundice one should have roentgen-ray pictures taken to see if diverticula are not the cause.

Dr. McGlannan (closing the discussion).—With reference to the remarks of Dr. Crisler, in describing the operation I neglected to say that we drew down on the diverticulum until we got at the ileum and saw that this structure rose from the convex border of the small intestine and that it had a slender mesentery running up along its side, which settled the question of contraction or diverticulum. Unquestionably it was a congenital affair.

A common type of obstruction in connection with Meckel's diverticulum is intussusception. Fitz, in 1888, collected a number of cases of intussusception due to Meckel's diverticulum. In the great majority of cases, where there was no external protrusion through an umbilical fistula, the obstruction was due to intussusception beginning in an invaginated Meckel's diverticulum and then going on down to make all kinds of intussusception.

CONTRACTURE OF THE PSOAS PARVUS AS AN EXPLANATION OF OBSCURE ABDOMINAL PAIN IN CERTAIN CASES

By Lloyd Noland, M.D.
Birmingham, Ala.

The twentieth edition of *Gray's Anatomy* (E. H. Lewis, editor) describes the psoas parvus as follows: "The psoas minor (psoas parvus) is a long, slender muscle placed in front of the psoas major. It arises from the sides of the bodies of the twelfth thoracic and first lumbar vertebræ and from the fibrocartilage between them. It ends in a long, flat tendon, which is inserted into the pectineal line and iliopectineal eminence, and, by its lateral border, into the iliac fascia. This muscle is often absent. Nerve supply; by a branch of the first lumbar nerve. Action: the psoas minor is a tensor of the iliac fascia." Other standard works on human anatomy give practically the same brief description of this muscle.

In 1911, while performing an exploratory laparotomy on a young woman who had had two previous operations, first an appendectomy and second an exploration for the relief of supposed intra-abdominal adhesions, I found in an otherwise absolutely negative abdomen a tense, sharp band following the course of the right psoas. This band was almost as sharp as a knife-blade, lifting up the posterior parietal peritoneum and forming a well-marked division across the right abdomen. There was no corresponding band on the left side, although the tendon was easily palpable.

This young woman had been suffering for some six years with abdominal pain, and had experienced no relief from either of her previous operations. As the above-described band was the only suggestion of any lesion that could be found, the peritoneum was divided laterally over the band, revealing the tense, glistening tendon of the psoas parvus. The tendon was divided between hemostats, snapping back and leaving about a two-inch space between the divided ends. The peritoneum was closed with a simple running suture. Almost immediately after recovery from the anesthetic, this patient sent for me and told me, with great joy, that she was entirely free from the pain from which she had suffered so long. She was under my observation for several years following this operation and had no recurrence.

Since this experience we have always examined for this condition when exploring the abdominal cavity, and in a period of ten years a total of 7 cases have been observed. All of these cases have been women between the ages of eighteen and thirty-four, and 6 of them had previously undergone one or more laparotomies without relief.

Following division of the tendon, 6 of the 7 cases were entirely relieved of symptoms, and the seventh case was partly relieved; 2 cases were done through an enlarged McBurney incision by stripping back the parietal peritoneum with exposure of the tendon, and the others through either median or right rectus incision, with transverse incision of the peritoneum. The contracted tendon has in every instance been easy to pick up and divide. In 6 cases the contracture has consisted of a single sharp-edged tendon and in 1 case of a double tendon.

A careful search for information on this subject through available literature has been negative, except for an excellent article by T. L. MacDonald, of Washington, published in *Surgery, Gynecology and Obstetrics*, August, 1914, in which article he reports 5 cases.

Case I.—Mrs. S., white, American, aged twenty-six years, II-para. Admitted to Colon Hospital, Panama Canal Zone, in May, 1911, with history of pain in the right lower abdomen, gradually increasing in severity over a period of six years. Two laparotomies had been performed, one in 1907, in New York, at which time it was stated a "chronic appendix" had been removed, and another operation in 1909, also in New York, for the relief of adhesions. The patient complained bitterly of pain in the right iliac and right lumbar regions, with radiation at times to the right thigh. Pain was somewhat relieved by the recumbent posture, with flexion of the right leg and thigh. Physical examination was absolutely negative, except for a definite area of extreme tenderness in the right umbilical and lumbar regions, with some spasm of the rectus and oblique muscles on deep palpation. This case was kept under observation for about three weeks, and was then explored at her urgent request. The result of this exploration has already been explained in the text.

Case II.—Mrs. B., white, American, aged twenty-two years, nullipara. Admitted to Colon Hospital, Canal Zone, in 1912. This patient had been suffering with pain in the right lower abdomen for about four years. She stated that two years previous to my observation she had been operated on for a "chronic appendix" by a competent surgeon in Minneapolis. Operation did not give relief. Pain was persistent and somewhat aggravated by muscular exertion or walking. Some relief could be secured by rest in bed with flexion of the right leg and thigh. Constipation was severe. Physical examination was virtually negative. Exploration was decided on at the urgent request of the patient, and was performed in July, 1912, under ether anesthesia, through a right rectus incision. Thin omental adhesions were present at the site of the previous McBurney incision, but otherwise the exploration was negative, except

for a very tense psoas parvus contracture, which was divided. This patient experienced immediate relief of pain, and when last heard from, some three years later, had had no recurrence.

Case III.—Mrs. A., white, American, aged twenty-nine years, III-para. Admitted to Ensley Hospital, Birmingham, Alabama, in August, 1914. Complaint: Severe and almost continuous pain in the right lower abdomen for a period of about four years. Laparotomy about three years previous by a competent local surgeon, who advised that he performed right salpingectomy—had been done without relief of symptoms. Physical examination was negative. Catheterization of the right ureter was negative. In September, 1914, exploratory laparotomy was done through a McBurney incision. The appendix was apparently perfectly normal, but was removed. A very tight psoas contracture could be easily felt, and division was done by stripping back the parietal peritoneum. This patient also experienced immediate relief, and there has been no recurrence up to the present time.

Case IV.—Miss J., white, American, aged eighteen years. Admitted to Employee's Hospital, Birmingham, Alabama, July 10, 1920, with diagnosis of subacute appendicitis. The patient was extremely nervous and somewhat emaciated. She had been suffering for two years and a half with severe pain in the right lumbar region, and had been advised on a number of occasions to have the appendix removed. Stools, urine and Wassermann were negative. Roentgen-ray examination was negative. Constipation was extreme. The patient was carefully observed from July 10 to July 23, on which date exploratory laparotomy through a McBurney incision was done, under gas-oxygen anesthesia. The appendix was normal, except for a few filmy adhesions about the base. The pelvis was entirely

negative. A very tense psoas band was easily demonstrated and was divided in its mid-portion. The patient made a rapid and complete recovery, with absolute cessation of symptoms, large gain in weight and an absolute return to normal. The constipation was entirely relieved.

Case V.—Miss E., white, American, aged twenty-three years. Admitted to the Employee's Hospital, Birmingham, Alabama, October 14, 1920, with history of continued pain, which was very severe, in the right lumbar region, with radiation to hip and thigh, for a period of three years. Some two years previous to admission appendectomy was performed in Memphis, Tennessee, with no improvement. For six months following this operation she was treated in plaster jackets, the diagnosis being incipient Pott's disease. Constipation had been severe since the onset of symptoms. Complete physical examination gave practically negative results. The patient was somewhat nervous and emaciated. On October 22, 1920, exploratory laparotomy, under gas-oxygen anesthesia, was done through a right rectus incision. There were some light adhesions in the area of the previous incision, but otherwise examination was negative, except for a well-marked and very tense psoas parvus. The posterior parietal peritoneum was divided transversely and the tendon exposed and cut. The patient made a rapid and complete recovery, with absolute cessation of symptoms.

Case VI.—Miss T., white, American, aged twenty-four years. Admitted to Employee's Hospital, Birmingham, Alabama, March 1, 1921, with history of severe pain in the right lower abdomen for a period of five years, with severe constipation, frequent headache, frequent attacks of nausea and vomiting and marked emaciation. The patient stated that she had spent the greater part of the past three years in bed. Some three years previous to

admission appendectomy was performed by a competent local surgeon, without any relief of symptoms. Tonsillectomy was done one year afterward. The patient had been treated by a number of different men with absolutely no results. Careful physical examination, fluoroscopic and cystoscopic examinations, and laboratory tests were all virtually negative except for marked tenderness in the region of McBurney's point, with almost constant rigidity of the abdominal muscles on the right side. On April 5, 1921, exploratory laparotomy, under gas-oxygen anesthesia, was done through a right rectus incision. The abdomen was filled with rather dense adhesions, involving the gallbladder, the duodenum, the cecum and the ascending colon. A very tense psoas parvus muscle was easily demonstrated. A long and careful dissection of adhesions was done, followed by division of the contracted tendon. The patient had a rather stormy convalescence, with only partial alleviation of symptoms. She had no further pain radiating to the thigh, however, and very much less pain in the lumbar region. She was able to be up and about and was in very much better condition than she was prior to operation. This patient was brought back to the hospital about December 1, 1921, with acute intestinal obstruction, caused by a constricting band in the mid-ilium. In operating for this obstruction it was found that adhesions had recurred densely in the upper abdomen, which we think accounts for the partial failure of our first operation. There was no recurrence of the contracture of the psoas parvus.

Case VII.—Mrs. T., white, American, aged thirty-three years, nullipara. Admitted to Employee's Hospital, Birmingham, Alabama, June 22, 1921, with history of severe pain in the right lower abdomen for two years, with severe constipation, headache and nervousness. Six months previous to admission she had been operated on for subacute appendicitis without relief of symptoms, which

have since become worse. Careful physical examination was virtually negative. Exploratory laparotomy was performed on June 28, 1921, under gas-oxygen anesthesia. There were a few light omental adhesions about the head of the cecum and at the site of the previous incision, and an extremely tense psoas contracture was present, which was divided. The patient made an uneventful recovery, with complete cessation of the symptoms, which condition has continued up to the present time.

In my opinion this contracture is not common, but I think that its occasional occurrence may explain certain cases of obscure abdominal pain. The cases listed above were the only ones of this condition discovered in over a thousand laparotomies, but even with this occasional occurrence I think that the condition is worth the attention of all surgeons. Each of these cases was very carefully worked up, with medical, orthopedic and urological consultation, and in no instance was exploratory operation undertaken until every other practical means of diagnosis had been used, with negative results.

DISCUSSION

Dr. J. M. Mason, Birmingham, Ala.—The occurrence of acute abdominal pain in the right side of the abdomen is very hard to explain in many instances. The pain associated with ureteral strictures has been explained many times before this Association and in a certain number of cases ureteral stricture is the cause.

Duodenal diverticula and Meckel's diverticulum as presented this morning answer for some cases which previously were not understood. I am hopeful that this contribution of Dr. Noland will make plain a further number of these cases.

I have discussed this matter with Dr. Noland in the last two months, and since that time in the autopsy room at the Hillman Hospital I have had occasion to palpate the normal psoas parvus tendon in a number of instances. The normal

psoas parvus does not present any sharp band, and in exploring the right side of the abdomen the presence of this abnormally sharp band should be easily detected and picked up. I think, therefore, that we might well add to the other points in our explorations the importance of searching for this sharp band, and if we find it to divide it.

Dr. Andrew J. Crowell, Charlotte, N. C. (a visitor).—I think a careful urologic examination should be made in every case of abdominal pain, and especially in cases of pain on the right side. Pressure is the cause of a great deal of these pains. A ureterogram will frequently show ureteral obstruction and a dilated ureter above the obstruction. A dilated ureter does not necessarily mean that we have a stricture of the ureter. It may be due to external obstruction, as in the condition referred to in the paper. It may be produced by aberrant bloodvessels or anything which impinges upon the ureter.

I think this paper should cause those of us who heard it to look a little more carefully into the causes of abdominal pain and to keep in mind intra- as well as extraureteral obstructions as etiologic factors in their production.

Dr. William S. Baer, Baltimore, Md.—I should like to ask Dr. Noland what he considers to be the etiology of the spasm of the psoas parvus? It is probably not a congenital affair so far as tension of the muscle is concerned, and I should like to know what his explanation of the etiology of the spasm of that muscle is.

Dr. Noland (closing the discussion).—I realize fully that there is considerable question as to the actual effect of these contractures, but there is no doubt in my mind that they exist and that they cause certain definite symptoms. I am sorry that I cannot give an intelligent answer to Dr. Baer's question as to etiology, except to say that most of these cases have given a definite history of some inflammatory condition either appendical or pelvic on the affected side. Every case has been carefully roentgen-rayed and also examined by a competent urologist. In no instance has any change in the spinal column been demonstrated. I believe, however, that certain cases of obscure lumbar pain may be due to this condition and that it should be kept in mind in routine examinations. It is a curious fact that in making the intra-abdomi-

nal examination under light anesthesia it has been frequently noticed by us that one psoas parvus stands out much more prominently than the other. Complete anesthesia may and usually does give relaxation of this tendon. If relaxation is not obtained tenotomy is done. In each of the cases listed tenotomy under deep anesthesia has resulted in wide separation of the divided tendon.

IDEAL CHOLECYSTOTOMY: A VALUABLE PROCEDURE IN CERTAIN CASES OF CHOLELITHIASIS

By A. Murat Willis, M.D.
Richmond, Va.

There are cases of gall-bladder disease where diagnosis is simple and operative treatment generally successful When a history of recurring attacks of colic, often associated with fever and jaundice, is obtainable; when the physical examination reveals a tumor or localized tenderness in the region of the gall-bladder; and when roentgenological study gives no indication of disease of the stomach, duodenum or appendix, but suggests involvement of the gall-bladder, we are reasonably sure of the ground upon which we stand. In these cases doubt is removed by the very evident pathological changes revealed on opening the abdomen. The institution of appropriate surgical measures will, practically always, cure these patients; or, at least, afford a considerable degree of relief.

As C. H. Mayo[1] has recently pointed out, however, such cases as these represent the terminal stages of gall-bladder pathology. This author stresses the importance of earlier diagnosis and operative interference, so that our patients may be saved from the crippling local lesions as well as the danger of involvement of other organs. This advice is sound, but the attempt to follow it introduces actual difficulties for the diagnostician and potential dangers for the patient.

We are told that the detection of these early cases is rendered possible through the history which they give. Though physical and roentgen-ray examinations are negative, if the patient states that he has suffered from dyspepsia, when he complains of epigastric fulness after eating, associated with frequent eructations of gas, there is strong likelihood of the existence of a cholecystitis, provided careful examination fails to reveal the presence of disease elsewhere.

Believing that the patient is suffering from cholecystitis, surgeons recommend either cholecystostomy for drainage or else the removal of the gall-bladder. The attempt has been made elsewhere[2] to point out the evil consequences which are prone to follow the former of these procedures in the cases of slight disease of the gall-bladder, the resulting infection and adhesions rendering the patient's condition worse than it was before operation. On the other hand, are we not becoming a little overenthusiastic in regard to removal of the gall-bladder? The results which have followed cholecystectomy with omission of drainage are certainly good, but it would seem wiser to reserve this operation for cases where we are reasonably certain that the organ is diseased. If we are to believe this is the case, in spite of the fact that both inspection and palpation of the inner and outer walls are negative, the gall-bladder occupies a unique position, for no other abdominal organ may be diseased to the extent as to render its removal necessary without giving gross evidence of such involvement.

Earlier in my experience, simple cholecystitis was rather infrequently recognized. In a series of 549 cases operated on prior to 1918, because of supposed gall-bladder disease, 86 per cent of the patients showed the presence of calculi, while only 14 per cent were instances of noncalculous cholecystitis. Impressed by the fact that I had, apparently, been derelict in my duty toward the patients, the attempt was made to increase the proportion of cases where the

diagnosis was made in the precalculous stage. This attempt has been so far successful that, in a series of 100 cases operated during the past two years, stones were absent in 25 per cent. The sense of gratification which might be expected to follow this apparent increase in diagnostic skill is lessened, however, but the results of microscopic examination of the gall-bladders or sections removed at operation: 10 of these gall-bladders—or 40 per cent of those which did not contain stones but were operated on because they were considered diseased—showed no histological changes which could be considered pathological. In other words, in the eagerness to forestall the streptococci, it would appear that a considerable number of normal gall-bladders have been operated on largely because the former owners gave a history of definite digestive disturbances accompanied by epigastric fulness and gaseous eructations.

In a recent paper by Jacobson,[3] it is stated that of 365 cases of cholecystitis operated on at the Peter Bent Brigham Hospital, in only 50 instances (13.7 per cent) were stones absent from the gall-bladder or ducts. Of these 50 cases, 16 were found to have normal gall-bladders when the organ was examined histologically, so that in this institution approximately 1 patient out of every 3 subjected to cholecystectomy for "simple cholecystitis" parted with a normal gall-bladder, the failure of the patients to obtain relief following the operation confirming the belief that the diagnosis of cholecystitis was a faulty one.

In increasing the proportion of cases of noncalculous cholecystitis in my series, as compared to Jacobson's, the proportion of incorrect diagnosis had been raised from 32 to 40 per cent. When we encounter reports of series where almost 40 per cent of the patients subjected to cholecystectomy were supposed to be suffering from noncalculous cholecystitis,[4] one cannot forbear speculating as to how many normal gall-bladders were sacrificed.

In addition to these borderline cases of cholecystitis

there are others in which we should hesitate to decide upon the employment of radical measures. It is with some trepidation that I acknowledge a faith in the existence of the "silent" gallstone. Possibly because of an increase in the amount of cholesterin or a decrease in the solvent power of the bile for this substance, it would seem conceivable at least that sterile calculi could be formed in the gall-bladder. Even though we accept the view that all biliary calculi arise as the result of infection, is it not possible that the infectious process in the gall-bladder, which gave rise to the stones, might eventually be overcome and the calculi remain as "tombstones" of the dead bacteria? On the strength of postmortem examinations the incidence of gallstones is placed as high as 12 per cent in persons dying from all causes, and yet we know that not even a small fraction of 12 per cent of the population ever suffers from symptoms severe enough to necessitate seeking surgical treatment. Every abdominal surgeon has discovered calculi in the gall-bladder of patients who gave no history of gall-bladder disease and who were operated on for disease in other organs in no way connected with the gall-bladder. W. J. Mayo[5] reports that in 1244 cases of women operated on for uterine myomata at the Mayo Clinic, 92 (7.4 per cent) showed the presence of biliary calculi; while in patients operated on for various gynecologic lesions, Peterson[6] encountered gallstones in 12.5 per cent. I am convinced that many of these patients suffer from symptoms so slight as to be unrecognizable, and that in a certain proportion the presence of the calculi will cause no serious disturbance. If we accept this view, are we justified in drainage of the gall-bladder after accidental discovery of the gallstones? The realization that this course will result in the formation of dense, crippling adhesions in many instances, producing very definite symptoms, is certainly reason for hesitation. On the other hand, should the apparently normal gall-bladder be removed? Though it has been claimed that

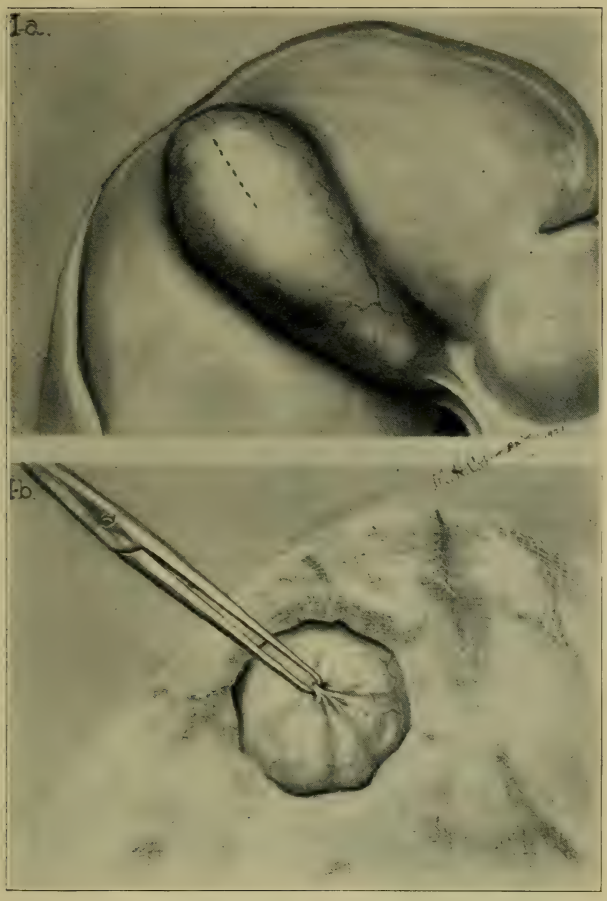


FIG. 1.—In upper illustration is shown line of incision; below, Moynihan's method of isolating gall-bladder is illustrated.

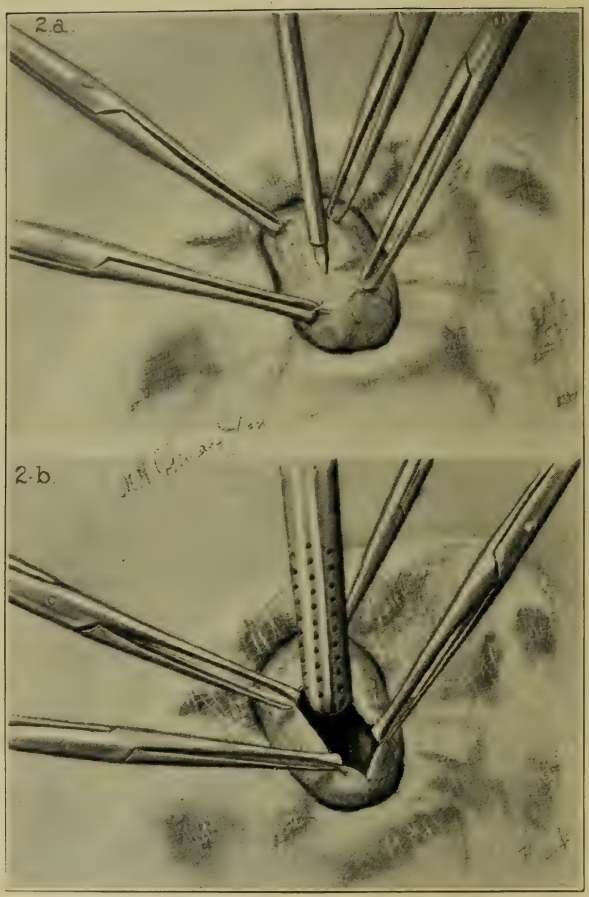


FIG. 2.—Above, the trocar just before entering gall-bladder. In lower illustration, the gall-bladder has been opened and the irrigator-aspirator introduced.

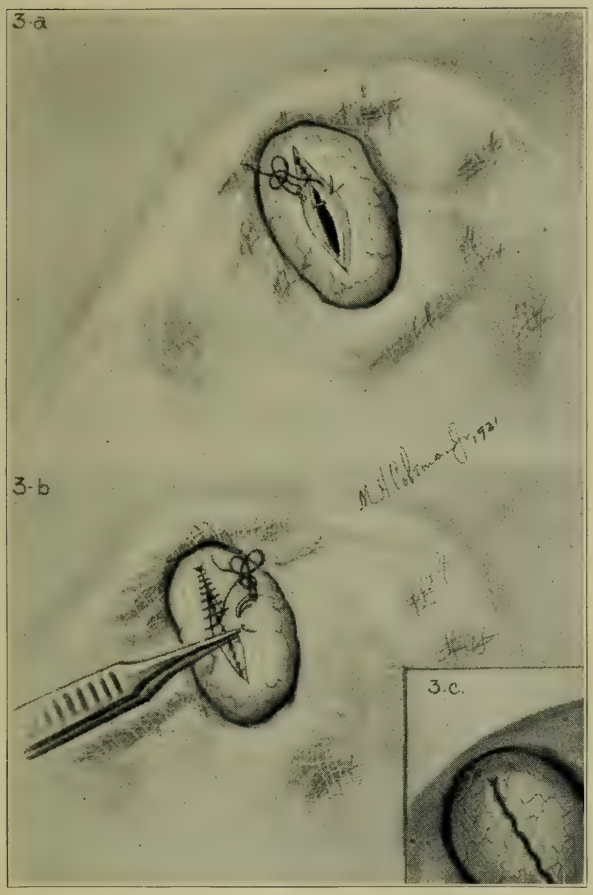


Fig. 3.—Closure of incision in gall-bladder.

removal of the gall-bladder does not lead to any disturbance, it has not been proved to be free from exerting any detrimental action. Most truthfully has it been said, "Uncertainty as to function and confidence in readjustment are, at best, questionable motives for adventures in ablation."[7]

Is there no middle course that may be followed in these cases? Because of a history suggesting cholecystitis, or because of the accidental discovery of gallstones, are we compelled either to subject the patient to the chance of an accentuation of his discomfort or to a loss of a normal organ? It has seemed to me that in the ideal cholecystotomy, with the omission of drainage, such a middle course is to be found. This operation was first performed at a time when diagnostic methods were crude and operative technic poorly developed, and because the results obtained under those conditions were poor is no justification for the almost universal condemnation of the operation that is now encountered. Though the literature abounds with reports proving—according to the bias of the operator—the superiority of cholecystostomy or of cholecystectomy, I am unaware of a single recent series of cases in which cholecystotomy was employed with disastrous results.

The objections that may be advanced against cholecystotomy are: (1) A failure to cure the disease, or (2) damage from escape of bile into the peritoneal cavity.

It has been pointed out that, with the use of existing methods, a certain proportion of the cases operated upon for gall-bladder disease in realty have normal gall-bladders; therefore, the drainage or removal of the gall-bladder would not effect a cure. Cholecystotomy, however, would allow an internal exploration of the organ in these suspected cases. If externally and internally the gall-bladder gave no signs of disease, no matter how much "dyspepsia" the patient had suffered from, it scarcely seems that there is ground for more radical measures. On the other hand, if we accept the view that sterile, symptomless gallstones

may exist, it would indeed seem possible that they might be removed and the gall-bladder incision afterward closed tightly, thus accomplishing a cure with as much certainty as would be the case after cholecystectomy.

As to the second point, namely, the possibility of the escape of bile into the peritoneal cavity, the danger is more fancied than real. In the first place, with the technic to be illustrated, there is no reason why bile should escape. Bile-pressure—either as a result of the secretory activity of the hepatic cells or the contractile power of the gall-bladder—is low; so low that there is no danger of leakage through a properly sutured wound—provided no foreign body, such as a drain, be placed in contact with the suture line. Even though a small amount of bile did escape into the peritoneal cavity, no serious harm would ensue. I have found that making an incision into the gall-bladder of dogs several times larger than the diameter of the common duct not only is survived, but that examining the peritoneal cavity several weeks afterward fails to show any effects except the presence of adhesions in the vicinity of the gall-bladder.

Not only is the freedom from danger of cholecystotomy demonstrable by animal experimentation, but the opportunity to use the operation clinically has occurred in a few cases, and the results obtained here have still further convinced me that there is a definite field of usefulness for this procedure. In the present state of our knowledge it would seem that this operation is definitely indicated (1) for the purpose of exploration in those cases where there exists more than a possibility that we are dealing with a normal gall-bladder, and (2) to remove the danger of future trouble when calculi are present as sterile foreign bodies in a gall-bladder free from pathological changes.

Technic.—In performing the operation of cholecystotomy in the cases in which it is indicated, it is scarcely necessary to emphasize the importance of careful technic. Three points

deserve especial mention: (1) The avoidance of unnecessary trauma to the gall-bladder; (2) protection of the adjacent peritoneum from contact with the concentrated and, possibly, infected bile; (3) tight closure.

Seizing the gall-bladder with clamps injures the wall and will inevitably interfere with healing; the organ must be handled with the utmost care. Packing gauze around the gall-bladder, according to Moynihan's suggestion, preliminary to opening it (Fig. 1 *b*) prevents soiling the peritoneum with bile. A trocar is then thrust through the wall (Fig. 2 *a*) and the bile removed as thoroughly as possible. Next, the opening in the gall-bladder is enlarged and the irrigator-aspirator introduced (Fig. 2 *b*), the gall-bladder being carefully irrigated with isotonic saline solution. The gall-bladder is then carefully inspected, internally as well as externally, and any calculi that may be present are removed.

It has been found that the use of a lens giving a magnification of ten diameters is a great assistance in the internal inspection, bringing out detail that could not be detected by the unaided eye.

In closing the gall-bladder incision, a small curved intestinal needle and No. 0 to No. 1 plain catgut are employed. The first line of sutures includes the muscular and submucous coats, but does not penetrate the mucosa or the visceral peritoneum (Fig. 3 *a*). Finally, the edges of the peritoneal coat of the gall-bladder are brought together by a stitch which occasionally dips down to include the muscular coat, thus eliminating dead space (Fig. 3 *b*).

Bibliography

1. Mayo, C. H.: Cholecystostomy versus Cholecystectomy, Collected Papers of the Mayo Clinic, 1915, vii, 256.

2. Willis, A. M.: Some Problems in Connection with the Surgery of the Biliary Tract. In press.

3. Jacobson, Conrad: Gall-bladder Disease: A Statistical Study, Arch. Surg., September, 1920, i, 310.

4. Mayo, C. H.: Cholecystectomy with Modified Drainage, Collected Papers of the Mayo Clinic, 1920, xii, 119.

5. Mayo, W. J.: Innocent Gall-stones a Myth, Jour. Am. Med. Assn., April 8, 1921, lvi, 1021.

6. Peterson, R.: Gall-stones during the Course of 1066 Abdominal Sections for Pelvic Disease, Surg., Gynec. and Obst., 1915, xx, 284.

7. The Functions of the Gall-bladder and the Bile Ducts, editorial, Jour. Am. Med. Assn., November 26, 1921, lxxvii, 1738.

DISCUSSION

Dr. J. Shelton Horsley, Richmond, Va.—I wish to congratulate Dr. Willis on his excellent paper. It fills a distinct want. The percentage of cases in which ideal cholecystotomy can be done, as Dr. Willis mentioned, is certainly small; nevertheless there is a very definite percentage of such cases. Since hearing the doctor talk about it I had a case a short time ago in which I expected to do that. On opening the gall-bladder I found some slight pathology and I drained. I believe in cases in which stones are found incidentally, and the patients have undergone a prolonged operation for something else. This simple measure should be life-saving as compared with cholecystectomy.

Dr. Ernst Jonas, St. Louis, Mo.—Undoubtedly in the past we have frequently removed gall-bladders which we now wish we had not removed. On the other hand if we follow in a general way the advice given by the essayist we may go to an extreme in the other direction. We may leave in many gall-bladders which we wish we had removed.

Dr. John E. Cannaday, Charleston, W. Va.—I believe the principles enunciated by Dr. Willis are absolutely sane, logical and correct. I have been very much interested for several years in Dr. Willis's method of removing the gall-bladder and closing the wound without drainage. For some time I only ruminated over this matter and finally took it up again, and up to the present time I have removed fifteen gall-bladders and closed the wound without drainage. In all these cases the results have been entirely satisfactory from an operative standpoint. The stay of the patients in the hospital is shortened and they are made much more comfortable.

Dr. Henry O. Marcy, Boston, Mass.—I did not intend to speak on this subject. I happened to be the first man in America to operate for gallstones and I have done all sorts of operations from that time until the present. I do not believe any of us can make any serious objections to the views enunciated in this paper.

Dr. Winslow.—When did you first operate, Dr. Marcy, for gallstones?

Dr. Marcy.—It was in the '70's.

Dr. Robert T. Morris, New York City.—There is one point I should like to make. If one is as careful about closing the cystic duct as Dr. Cannaday is one may have equally as good statistics as he presents, but for the average operator like myself there is a particular element of danger. Let us take three structures that are somewhat alike in general appearance, the appendix, cystic duct and Fallopian tube. If you ligate the appendix like an artery with plain catgut and do not bother to turn in the stump—simply do not bury it—you may say it will always remain closed as a general statement; that it will never open again. Why? Nature is all through with the appendix; she does not need it again. If you close the Fallopian tube in the same way, see where you would come out. If you close it even with silk or silver wire, if you wait long enough the closed part will open and the Fallopian tube will have its lumen restored. Why? Nature thinks a whole lot of her sexual apparatus, for that means the continuing of the race. She is not through with the sexual apparatus. Now then how about the cystic duct? It was about the same diameter as the other two structures, it looks about the same, and it is about the same sort of affair in a general way; but it is a whole lot different from the appendix and from the Fallopian tube in response to ligation. Nature is not quite sure whether she cares much about the cystic duct or not. She does not want the appendix, she does want the Fallopian tube, but she is on the fence in regard to the gall-bladder and cystic duct. She leaves these out in some animals altogether, and some of the people who have had their gall-bladders removed, so far as I know, never knew it except when they looked over their bank accounts. The point is this: The ligated

cystic duct will not always remain closed benignly, but in a certain proportion of cases it will open unexpectedly after one has closed it, and one will have leakage of bile into the peritoneal cavity. One may never find it out if the bile is not infected or in great quantity, but the accident has serious possibilities.

Dr. E. S. Judd, Rochester, Minn.—When Dr. Willis brought up the point of closing the abdomen after cholecystectomy I felt quite sure he was wrong and would get into serious trouble. I based my opinion on some experimental work I had done. I found that after removing the gall-bladder of animals there was increased pressure in the common duct. I argued that probably in a certain number of cases the pressure would be great enough to pull the ligature from the cystic duct and make serious trouble. Willis's recommendation of closing the abdomen without drainage after cholecystectomy in selected cases is a good one. We have closed several hundred cholecystectomies without abdominal drainage and have not regretted in in a single instance.

I believe we all take out gall-bladders when we should not. One point that occurs to me is this: Sometimes in exploring the gall-bladder and not finding inflammation, may it not be an interval when there is no inflammation there? Like an appendix case we may operate in the chronic stage or when it is free from inflammation.

Another point I want to discuss with Dr. Willis is, How much information can we get from opening the gall-bladder and exploring it from the inside that we could not get without doing this? We explore the gall-bladder from the inside, take a piece of it for microscopic examination and finding a round-cell infiltration in the wall its removal is indicated. This idea has been given up largely in view of the information gained from exploring the inside of the gall-bladder, which is essentially much more than we can get from simple palpation of the gall-bladder.

Dr. Edgar P. Hogan, Birmingham, Ala.—This is an interesting subject and the temptation is to do more gall-bladder work than we really should. To decide how far we should go in doing a laparotomy in correcting pathology I think requires great discretion and courage.

I remember, in 1914, of operating on a case that gave a

history of repeated gall-bladder attacks; the patient at that time was suffering from a pelvic condition, extensive in character, and she was to be operated for the pelvic condition. Having a history of previous gall-bladder attacks I examined the gall-bladder before doing the pelvic work and found it absolutely full of gallstones. This woman had been having attacks of gall-bladder trouble for two or three years. I proceeded, after having examined the gall-bladder, to do the pelvic work. She was a woman forty-six years of age, and the ovaries, tubes and uterus were in a chronic condition, giving her great trouble, and I removed the whole thing. To my amazement I found after that there was a retrocecal appendical abscess. I simply drained the abscess and closed the incision. This woman has had two attacks of gallstones since that time, one three years ago and one just recently. I asked Dr. Talley to see this case with me a few days ago. When this attack came on she was six miles in the country. It was thought necessary to get an automobile and bring her to the city as soon as possible. She arrived in Birmingham about two o'clock in the morning. I went to see her and gave her three-quarters of a grain of morphin and applied hot-water bags. The next morning Dr. Talley and my brother, Dr. George A. Hogan, saw the patient in consultation with me.

She had no temperature with these attacks at all; in fact, there was a subnormal temperature. We decided that it would be a good thing to take out the gall-bladder. After two days in the hospital she was able to go on a diet and suffered no inconvenience at all when I left. She said to me, however, "If this gives me any more trouble I want you to take it out." In operating for pelvic conditions where there is any infection, if one will examine the gall-bladder he will find that it frequently contains stones. In some of these cases I have, after having done the pelvic work, made a gall-bladder incision and have taken out the stones, doing a cholecystotomy and making the closure with a purse-string suture. After that there is no trouble at all.

I remember a case I had several years ago in which a woman was suffering with intense pain in the left iliac region. She had a leukocytosis of 16,000; her temperature was 102.5° and I could not decide definitely the cause of this pain in the left iliac region. The pain was not in the region of the appendix and the urinary findings were negative. She gave

a history of repeated gall-bladder attacks. I made a median incision and found that there was no trouble in the left iliac region, but that she had an acute appendix. The appendix had not ruptured. I removed it, examined the gall-bladder and found it was full of stones. These stones were very small. I closed the original incision, then made a gall-bladder incision and took out the stones. There were numerous small ones. I did not take out the gall-bladder but drained it. It seems to me there are active gall-bladders that produce stones and if taken out they will recur. On the other hand there are gall-bladders that are inactive. Many of them have stones but the gall-bladder is not functioning at all, and if there is no infection they may remain there with the gall-bladder as a functioning organ and give no trouble for years. I might have taken out the gall-bladder in this case, but I saw no reason for taking it out when it gave no trouble. On the other hand these other gall-bladders need to be out of commission that are producing stones, and if you take them out and drain them you leave an organ there that will form stones again. That is the type of gall-bladder that ought to be taken out.

Dr. John Wesley Long, Greensboro, N. C.—In regard to Dr. Willis's most instructive and interesting paper I should like to say that more than fifteen years ago I saw the late Joseph Price remove gallstones and then close the gall-bladder with a heavy silk suture.

Dr. Willis (closing).—In reply to Dr. Jonas: Of course, hindsight is better than foresight. All of us regret having failed to remove certain gall-bladders; even more we may regret having extirpated others, for it is easier to remove this organ than to replace it.

As regards Dr. Morris's experience of leakage of bile after cholecystectomy without drainage, all that can be said is that progress in surgery must not be prevented because certain operators cannot carry out the improved technic.

In reply to the remarks of my friend Dr. Judd, relative to regretting the failure to remove some gall-bladders where the patients suffered from suggestive symptoms but where inspection failed to reveal any gross abnormality of the organ, I should like to suggest the use of a magnifying glass in aiding in the examination at the time of operation. If the gall-

bladder appears normal outside and inside to the naked eye, and when even the use of the glass does not enable us to detect any abnormality, I should feel reasonably safe in allowing it to remain, believing that such a course would cause me less subsequent worry than removal of the organ.

In reference to the remarks of Dr. Long, I am sure that a great many surgeons in America are today removing stones and closing the gall-bladder—in other words, doing the ideal cholecystotomy. Because of the disfavor that this operator is looked upon by many leaders, however, they have hesitated to report their results. Since I became interested in his subject I have talked with men who have done the operation in certain cases. It is, I am convinced, a fact that there are cases of gallstones which do not cause symptoms but which are potential sources of future trouble. We have all had cases where, in the course of operation for some other condition, we have felt stones in the gall-bladder, but even on subsequent questioning no history of gallstone colic or other symptoms can be elicited. Nevertheless, one can never say when trouble may develop later if the stones be allowed to remain.

I believe that there are three operations, each one of which has its indications in gall-bladder surgery: Cholecystostomy in certain cases; cholecystectomy; and ideal cholecystotomy in others. We must not resort to drainage in all cases nor should the gall-bladder be always removed; there are some cases in which we should preserve the gall-bladder while at the same time getting rid of the possible cause of future trouble.

THE LAST WORD ON HERNIA

By Henry O. Marcy, M.D.
Boston, Mass.

Last year you kindly gave me your approval of my address to the Association entitled, "The Semi-Centennial of the Introduction of Antiseptic Surgery in America." I now ask you to follow with me briefly my own history in the development of the modern technic for the cure of hernia, this very common affliction of the race. It is necessarily corollary to the new methods of surgical technic.

Fifty years ago this autumn I operated upon a large strangulated hernia, followed by primary union and permanent cure. The surroundings were most undesirable—a dirty room as well as a poverty-stricken patient, with only the light of candles. I closed the wound in the then usual way, when my late friend Dr. Clark, the attending physician, said, "Left in this way the intestines will be in the bed before morning, because the patient suffers from a severe asthma with frequent attacks of spasmodic coughing." I reopened the wound and closed it in layers of buried catgut sutures, furnished me by Mr. Lister. I must confess that I had a restless, troublesome night wondering if this new method of suturing might not endanger the life of the patient.

Encouraged by this result I soon operated upon other patients equally successfully. This was followed by a long series of bacteriological studies in animals showing the resultant changes which took place in aseptic wounds closed by absorbable buried sutures. The demonstration was

simple and conclusive. The suture was first surrounded by leukocytes. The suture material was slowly invaded by them and well-vitalized bands of connective tissue replaced them. The shape element was so evident that I at first thought the connective tissue of the suture was in a way a graft, vitalized and remaining permanently buried. The use of buried sutures in well-vitalized aseptic wounds was almost at once broadened to the closure of all wounds in all parts of the body, and, as you well know, they have replaced silk and linen almost exclusively.

For some years I had received my supply of catgut from Mr. Lister, and was so well satisfied with it that I had little thought of any possible danger, or that it could be supplanted by better material. One morning, in my public hospital service, I performed three laparotomies, using catgut recently sent to me from London. Streptococcal infection followed, with the loss of one life and two recoveries, only after long and painful suppuration. Bacteriological examination showed an active streptococcals in the suture material. Then followed years of continuous research for better material, finally culminating in finding the remarkable anatomical construction of the tendons in a considerable group of animals, and lastly of the tendons from the tail of the kangaroo, which are now in general use. At the outbreak of the World War the English Government conferred upon me a very exceptional compliment by commandeering for military service the entire Australian supply.

I have found it much easier to write a large quarto volume on hernia than to cendense a proper consideration of the subject within my time limit of twenty minutes. Few appreciate the careful study which has been given to this subject and the exceptional literature on its discussion. In the first edition of the *Index Medicus*, over eighty quarto pages are given to the titles and names of the various contributors.

When a graduate student in London I was granted the exceptional privilege of the painstaking study of the wonderful specimens prepared by John Hunter and his assistants, which remain still the greatest contribution to the Hunterian Museum. I learned to appreciate the most remarkable genius and ability of this great man, and the fruitage of these studies became one of the turning points in my surgical training. John Hunter is worthy of immortality as one of the founders of surgical science.

Sir Astley Cooper became his distinguished successor, and for years he was the leading instructor of surgery in the world. He taught more than eight thousand pupils. He was General Wellington's surgeon-in-chief at the battle of Waterloo, but his monumental work on hernia alone would make him immortal. In 1804, he published his first folio edition on hernia, and his second in 1827. The illustrations were chiefly made from his own dissections, by leading artists, at a cost of five thousand pounds sterling. I am the fortunate owner of both editions, of course now rarely found except in the great libraries. I purposed to reproduce this work necessarily in folio, because of the remarkable size and finish, only possible to a full page. The publishers were the great house of Langham & Company, of London. After a thorough investigation it was ascertained that only comparatively recently the plates had been melted up and as far as they could ascertain I was the first to make inquiry for them. Appleton was generous in giving me *carte blanche* in the publication of my quarto work, and he told me that the illustrations alone had cost him over six thousand dollars. Dr. John Collins Warren was one of Sir Astley's pupils, and to him is given the credit of the first operation upon hernia in New England. This was April 10, 1840.

The surgical treatment of hernia was for the most part limited to the relief of strangulated cases until after the introduction of antiseptic, or aseptic surgery.

The making and maintaining of an aseptic wound was

the great masterpiece of this generation. For this, very properly, Mr. Lister is entitled to an immortal remembrance. I have no recollection of his operating upon hernia at the time of my pupilage.

I had made careful studies of over a thousand autopsies and had given special attention to the normal as well as the pathologic conditions found. I had also studied a long series of hernia in babies and children and found that the internal ring was not seldom comparatively open at birth. From this I determined that the imperfect closure of this canal, for the exit of the testicle from the abdominal cavity, was the common cause of hernia.

Jules Cloquet, in 1817, published his anatomical researches upon abdominal hernia and concluded that the internal ring at birth was rarely completely closed and describes as normal anatomy a slight depression of the peritoneum over the internal ring as "the infundibular process of the peritoneum." One of my semiserious scientists stated that it was in evidence that the primeval ancestors were quadrupeds, because there are no valves in the perirectal veins. I make the suggestion that the too-common weakness of the inguinal canal is a yet stronger evidence of the quadrupedal theory, since all our four-footed ancestors escaped the penalty of hernia because the intra-abdominal pressure necessarily closes the inguinal canal.

When this condition does occur it produces a slight depression upon the lower segment of the canal, which commonly foreshortens the canal, and little by little the yielding of the parts takes place, which usually is not recognized until the canal admits a small part of the intra-abdominal structures, at first commonly only omentum. This may not be recognized until a very late period of life. The intra-abdominal pressure in a normal, well-constructed man is at right angles to this canal and permanently closes it.

I have made many studies of the function and action of the abdominal muscles in order that I might be the more

sure of these conditions. I had the good fortune of studying the great athelete, Sandow. When lying upon his back, in the horizontal position, he lifted two barrels of flour, one attached to each foot, without bending the knee. The extraordinary development of these abdominal muscles were as apparent as the biceps in the pugilist. Nature adapts this construction in only two other instances—the less-marked introduction of the biliary canal into the intestine and the ureter through the bladder wall.

The cure of hernia in the female is comparatively simple, since it is practically reduced to the closure, as in any other weak part, of the abdominal wall. Inguinal hernia in man is entirely another problem, the detail of which in its last analysis is not difficult, although the pathological complications are often extremely confusing and dangerous.

In the simpler form, the first factor is the peritoneal pouch after the reduction of its contents. This sac should be drawn by moderate tension, evenly closed by a fine continuous suture and resected. The divided structures must be separately unfolded, the cord carefully lifted upward on slight tension and the lower inner wall of the canal reconstructed, preferably with a double continuous tendon suture. This restores the canal to its normal obliquity and is the important factor of cure. Then the cord and vessels are replaced without undue constriction or injury and the external wall of the canal is closed in the same manner. The skin is carefully coapted by a fine subdermal absorbable suture and the wound sealed by iodoform collodion.

These tissues require much more than ordinary care to avoid injury and undue constriction, but the important factor of all is the careful reconstruction of the inguinal canal to its normal obliquity and thus prevent a special localized pressure on the internal ring. It is to be remembered that when thus reconstructed the intra-abdominal pressure is practically at an oblique angles to the canal and completely closes it.

The complications of pathological type are multiple when the intestine is included in the hernial sac. Sometimes the hernial tumor is most extreme in size. I have twice operated where the great scrotal sac extended nearly to the knee, including the major part of the intestinal canal, and the subsequent danger was due to the extraordinary abdominal pressure upon the returned intestines. Not seldom large sections of the omentum are so changed in their structure that their removal is necessitated. These complications are commonly dependent upon neglect, usually owing to the advice of the so-called hernial specialists and truss-fitters, notices of which are found in the newspapers. One manufacturing house in Philadelphia boasts of an annual product of 250,000 trusses.

The half century in review has quite changed the surgical problem in nearly all its aspects. When I first began to operate the general opinion was that a hernia comparatively easily held by a truss should not be operated upon; that children should be exempt from surgical treatment, with the hope that Nature would cure; that when irreducible they were considered too dangerous for operation; that strangulated hernias must be reduced, but these, of course, were always considered dangerous operations and are often so because of undue manipulation in improper attempts at reduction and delay.

Little by little all this has changed. Infected wounds are the decided exception and the mortality list has been reduced practically to zero. The complications which may be incident to necrosis of intestine involving resection are to be eliminated in the present view of operations undertaken for the cure of hernia. However, every surgeon should be competent to resect the intestine in comparative safety. In my entire series, covering half a century of seven hundred uncomplicated cases, I do not recall a single fatal case, and where the obliquity of the inguinal canal has been normally restored the cure is usually permanent.

I congratulate the public upon the fact that the operation for the cure of hernia is now almost universally approved and can be safely trusted in the hands of any surgeon completely trained. I anticipate that the coming generation will be relieved of its lifelong burden of truss-bearing semi-invalids.

During our late war many men that were excused from army duty on account of hernia were operated upon and afterward accepted. I am reminded of an illustrative incident: Many years ago I gave a lecture in Louisville, Kentucky, at one of our national conventions. Dr. Wathen and I were anxious to demonstrate by an after operation. He found the janitor of his medical college had a large scrotal hernia which seemed most fitting for operative demonstration. This faithful colored man had been a soldier in the Union Army and was drawing a pension. He cheerfully gave his consent to the operation until, just before the time appointed, he changed his mind. Dr. Wathen was very much provoked, since the operation was advertised, and he said, "Ben, I will discharge you, if you do not have the operation done now." The janitor in a greatly disturbed frame of mind said he would leave it to Dr. Marcy, but, "I can't have this here operation done 'cause I am a pensioner. This here bust is worth to me thirteen dollars a month." My reply was, "Ben, I think you had better keep it."

The fruitage of this incident is the reason for its narration. I wrote to my friend, Dr. Sternberg, then Surgeon-General U. S. A., and he immediately had an order issued that all soldiers pensioned for hernia should be given hospital treatment without cost, or otherwise their pensions would be suspended.

The connective tissue of animals was early utilized for a great variety of purposes when it was necessary to secure strength and high tension. The Homeric poems afford familiar illustration. In the "Odyssey" the strings of the

old Greek harp are described as made from the intestine of the sheep. The ancient Egyptian harp is said to have been strung in a similar manner. The celebrated Arabian writer Rhazes, who practised in Bagdad A.D. 900, described the stitching of wounds of the abdomen with the strings of the harp; and Alcucasis also mentioned the stitching together of wounds of the bowel with a fine thread from the intestine of an animal.

The careful student of the early history of surgery finds abundant evidence that the ligature was used as a hemostatic agent at a very early date.

Celsus, at the end of the first century, described the ligatures of ancient origin, and stated that it was used in the Alexandrian school of medicine, with the teachings of which he seems to have been familiar. He advised placing two ligatures upon the vessel and dividing it between the points of tying. Galen recommended its use; and Vesalius, in the sixteenth century, mentioned the ligature as a relic of the past, greatly underestimated in value because of the lack of anatomical knowledge. Its first application in amputations, on account of gunshot wounds, was doubtless by Ambroise Paré. At this time such wounds were cauterized with boiling oil antiseptic, in the belief that gunpowder in some way poisoned the wound.

Special studies, however, for demonstrating the value of the material used for ligatures, do not appear to have been made in the early history of surgery. Indeed there is little doubt that, whatever the material used, it was always considered as a foreign body to be ultimately eliminated from the wound; and the material, selected for its strength without special reference to the irritation which might be induced thereby, was naturally the thread, silk or hemp which was in ordinary domestic use.

To our distinguished countrymen, Prof. Physick, of the University of Pennsylvania, is undoubtedly due the honor of having reintroduced into surgical practice in modern

times what is known as the "animal ligature." His ligatures were made of chamois leather, and he and Dr. Dorsey usually rolled their ligatures on a marble slab to make them round and hard. The advantages claimed for this ligature by Dr. Physick were that, being composed of animal tissues, they would serve long enough to obliterate the artery and be speedily removed by the absorbents, thus avoiding the difficulty arising from a foreign body however minute. These ligatures were used in this country to a great extent and Sir Astley Cooper demonstrated their superiority in his own operations.

Dr. Hartshorn used strips of parchment for his ligatures. "My friend Dr. H. G. Jamieson, of Baltimore, has for a series of years been employing the animal ligature in an extensive surgical practice. He has used it in his many amputations of the limbs and of the mammæ; he has tied the carotid, the iliac, the femoral, the radial, the posterior tibial, the spermatic and other arteries with the buckskin ligature, and in no instance had secondary hemorrhage; and he states that he has never seen anything of his ligatures, and, of course, his wounds have generally healed by first intention. Dr. Jamieson gives to Dr. Physick the honor of having first introduced the animal ligature, but he contends that the practice of rubbing or drawing, to harden the leather, is highly reprehensible. He advises to tie the artery with a buckskin ligature very soft and a little broader than the thickness of the skin, taking care not to tie it too tightly. He states, as the result of his observations and experiments upon sheep, dogs, and other animals, that a capsule will surround the ligature if the capillary vessels be not too much disturbed or the vessel will be surrounded by an abundance of lymph and the ligature dissolved."

The method of Aetius and Celsus, revived by Abernethy—of applying two ligatures and dividing the artery between them—Dr. Jamieson condemned as unncessary, since by a single flat buckskin ligature the artery may be obliterated

without destroying its continuity. Hence he opposed all indissoluble ligatures of whatever material; he declared it not only to be unnecessary but highly hazardous to cut the inner coats of the vessel, as recommended by Jones and others, and agrees with Scarpa as regards flat ligatures; but by the use of buckskin he had no need, like him, to remove his ligatures on the fourth day. For a very able and interesting account of his views, which are of the highest practical importance, I would refer to the thirty-seventh number of the *Medical Recorder*, published at Philadelphia in 1827, and from which I quote the following extracts:

"We believe that the animal ligature will secure the patient from all these dangers except one, to wit, the awkwardness of the surgeon; and even in this respect the animal ligature is preferable, not requiring the precision of management essential to the cutting ligature. If the ligature is cut from the leather with care, it will always admit of being tied sufficiently tight, but can never be made to cut the coats, provided it is made of soft buckskin and not hardened by drawing it. It is less likely to slip even when somewhat insecurely applied, because, being elastic and soft, it is spread over a small space of the vessel and almost immediately adheres to it by its glutinous properties. It lies more securely, while the cutting ligature, resting on a mere line and having neither adhesive properties nor the advantage of a small vacuum between the vessel and the ligature, as is the case with the flattish adhesive ligature, is more likely to slip off. Besides, if we cut off the ends close, there is no risk of pulling them away by accident. In support of these assertions we have to offer the experience of several years' practice, during which we have used no other than the buckskin ligature, and no such thing as a secondary hemorrhage has ever occurred in our practice, extending alike to cases of aneurysm, tumors and amputations.

"We are, moreover, decidedly of the opinion that in no

case whatever have we had reason to suppose that the healing of a wound, accidental or surgical, was delayed by our ligatures; we never see anything of them after their application. Mr. Cooper tied the femoral artery in a female, aged eighty, with a ligature of catgut steeped in water, which was cut close and the wound was healed on the fourth day, and therefore healed by first intention. In many cases we believe the catgut would answer as well as the buckskin, but we are confident that a flattish ligature holds best and is most convenient. It may be proper to mention that this case occurred in 1817, three years after Dr. Physick's use of the leather ligature. If we are right in the opinion which we have just expressed, Dr. Physick is entitled to the credit of bringing into use the best ligature as to the material, but here his claim is at an end.

"Dr. Physick and Sir Astley Cooper have shown the advantage of using a substance which will serve as a ligature till the artery is obliterated, and be speedily afterward in the power of the absorbents, so that they will remove it. We will now proceed to point out our own views and endeavor to support them by experiment: 'First, we believe that with an artery sufficiently healthy to admit of its obliteration by the adhesion of its sides, it is best done by a ligature which will neither cut its coats nor strangulate, except in parts, the true *vasa vasorum*, so that the continuity of the vessel shall not be destroyed although we obliterate its caliber. Second, we believe that if an animal ligature of suitable material be properly applied, the vessel will be obliterated, the wound may be healed by first intention, and the ligature will not cause suppurating inflammation; but in due time, being dissoluble, the whole will be removed by the absorbents. There will be no break of continuity in the artery, the *materia arteriarum* will be removed and the vessel—which during the state of inflammation and the effusion of lymph was converted into a cord—will pretty soon afterward be resolved to a flat string of white cellular substance.'"

It will be observed that all the essentials, undertaken for a similar purpose, were not unlike those Mr. Lister repeated half a century later, and the former at a period when so little was expected of the American people in the way of literary productions, to say nothing of scientific research, that one of England's famous critics asked, "Who reads an American book?"

In the *History of Ovariotomy in the United States*, by the late Dr. Peaslee, it is stated that Dr. Nathan Smith, professor of surgery in Yale College in 1821, tied the arteries with leather ligatures (narrow strips cut from a kid-glove), which were returned into the peritoneal cavity; the incision was closed and recovery followed. Dr. John Bellinger, of Charleston, S. C., in 1835, successfully performed ovariotomy, tying two arteries in the pedicle with animal ligatures. Prof. Paul Eve, of Nashville, Tenn., wrote in 1876: "I have been in the habit of using the sinews of the deer for ligating vessels for forty years. The tendons of the deer, dried and torn in shreds and rolled into ligatures, are what I employ. They are obsorbed. I have occasionally used them as sutures."

These fragmentary experiences, drifting down to us through the years, teach that there was more or less blind groping after a something that should serve a better purpose than the routine of daily practice, in the use of hemp and silken ligatures, afforded. It was reserved for the present generation to make possible a scientific basis for the better consideration of ligatures and sutures in their application to the living structures. In the light of our present knowledge of surgical pathology the opposition—in the ligature in the days of Ambroise Paré—which we have been wont to attribute to the conservatism of ignorance and stupidity is invested with a new and vital interest. The amputated limb, seared with a hot iron as a hemostatic, a measure most barbarous and revolting, gave as a result an aseptic wound. Repair was necessarily slow and tedious, but

abundant granulations supervened to protect from septic absorption before the slough separated. The constricting ligature in the septic pocketed wound, with little care as to cleanliness, gave such secondary fatal results that we are sometimes led to wonder that the innovation of the ligature in the closing of the great vessels became the established practice. Had it not been for the extreme suffering and the frightful danger from secondary hemorrhage after the use of the cautery—slow healing giving imperfect results—it may well be questioned if even the indomitable spirit of Ambroise Paré could have made the innovation survive his own time.

A wiser and deeper philosophy sought solution of the problem as to the causation of suppuration in wounds and if its prevention were not within the possibility of the rule rather than the exception. The studies of Pasteur, Tyndall, our own Jeffries, Wyman and others—undertaken for the solution of the problem of spontaneous generation—brought fruitage to the human race little dreamed of by these wise philosophers. The genius of Mr. Lister seized upon the application of the thought, and with patient investigating spirit and painstaking toil he worked out the fundamental factors of the role of bacteria in wounds. It was not until rules could be formulated upon the scientific deduction that operative wounds should be free from suppurative processes, hitherto considered almost concomitants, that the proper conditions for the study of ligatures and sutures were rendered possible.

Of necessity, in intimate association with the question of the treatment of operative wounds, arose *de novo* a most interesting chapter devoted to the best means of controlling arterial hemorrhage. It was clear that the hitherto prevailing method of ligation, leaving the ends of the ligature long, extending from the wound, by so much at least led to infection and prevented primary union; while cutting the ligature short and closing the wound often produced

disastrous consequences, when the infection was thereby deeply buried. Even when the silken ligature was aseptically applied, it too proved an irritating foreign body, to be ultimately but slowly eliminated. In retrospect, with present knowledge, what seems a simple factorage of the problem proved extremely difficult of solution.

The conservatism of opinion, the prejudices of the large number of the surgical authorities of the time, wedded to present measures, misled by other phases of dominating thought—the so-called vital processes of inflammation, irritation, cell-proliferation, etc.—engrossed the subject with many difficulties. The demonstration that suppuration in a wound resulted from the introduction of a *something* from without, was the first real step of progress. To eliminate that something was the next problem for solution. It had been shown that the closure and intrafolding of the inner coat of an artery causes permanent closure of a vessel, and that the living structures unpoisoned by germ infection possess the power of easy disposition of the aseptic necrotic portion devitalized by violence.

On the contrary it was shown that the aseptic necrosed parts become invaded by living cells, which little by little produce a local change marked by early disappearance of the necrosed tissue. This naturally led up to the thought, Could not extraneous animal tissue be prepared in a way that, introduced into the vitalized structures, would give a similar result?

I know of no series of original studies better worthy of admiration or emulation than Mr. Lister's experiments undertaken for this purpose upon the lower animals notwithstanding that the laws of England necessitated his resorting to the Continent in order to make possible his investigation. His experiments were limited to the ligation of vessels, but there has resulted from his teachings the surgical treatment of the great arterial system with a safety hitherto deemed impossible.

Returning from my studies in Edinburgh, under Mr. Lister, in 1870, liberally supplied by him with a variety of the antiseptic materials, which he then advised to be used in operative treatment, I not only made use of catgut for the ligation of vessels but accident early furnished me the opportunity for a new application of the ligatures in the form of buried sutures. These were used in layers of buried sutures because of a large abdominal wound and was followed by primary union and permanent cure.

I made a long series of comparative studies in animals and demonstrated the changes supervening at different periods after operation. The demonstration was complete, that a living band of connective-tissue cells replaced almost entirely suture material, and this led to the closure of wounds in great variety by buried catgut sutures, and then followed with an investigation of catgut and its various methods of preparation.

I have elsewhere published in detail the streptococcal infection, which developed only along the line of the buried sutures of several surgical cases. The catgut used was from freshly opened specimens sent me from London, from which we cultivated an active streptococcus. This led me to an extensive investigation of the tendons in animals which might furnish sutures superior to catgut and much easier in preparation. In 1880, Dr. Simons, of Charleston, S. C., sent me admirable specimens from the tail of the fox squirrel, stating that he had often used them for delicate surgical purposes with great satisfaction. They were too short for sutures. I found a similar anatomical disposition of the multiple fasciculi, each individual tendon extending in a common sheath to the very extremity of the tail. Soon afterward I made a journey into the Sioux Indian country of the Northwest, that I might learn of the material in the sewing of skins. It was then selected from the fascia lata of the fore shoulder of the buffalo and moose. For coarse work these served a good purpose, as did also the tendon

from the hind leg of the caribou. They easily frayed and became irregular in attempting to produce fine sutures. I found the tendons in the tail of the opossum of the same anatomic construction as the squirrel, but these were still too short for more common use.

The comparative anatomists were silent upon the subject of the subdivided psoas muscle; but I reasoned that, both belonging to the subdivision of the marsupial group, the tendons from the tail of the kangaroo would be in every way superior.

In 1881, at The International Medical Congress held in London, I read a paper advocating the "Cure of Hernia by the Reconstruction of the Obliquity of the Inguinal Canal in the Closure of the Hernial Wound by the Use of Kangaroo Tendon Sutures." I published in some of the Australian journals my discovery of the remarkable value which would ensue to surgery by the use of kangaroo tendon buried sutures and advocated their careful preparation and shipment. They must be taken immediately after the slaughter of the animal, quickly sun-dried and kept dry in shipment. After a long series of partial failures we have been enabled to obtain a dependable product. The tendons from the large kangaroo are far less satisfactory, since for general use, they are much too large and usually are damaged in subdivision. I have advised kangaroo tendon sutures to be used in all varieties of aseptic wounds. Their use is now general and their value well recognized.

In my last visit to London, when I saw Mr. Lister operate, I discussed with him what I considered the advantages which arise from the non-use of the drainage tube in all types of aseptic well-vitalized wounds. He stated that he used shorter drainage tubes and left them a shorter time in the wounds, but he thought that the exudative lymph should be considered as an injurious product and removed. To which I replied that, on the contrary, I considered it Nature's first aid in the processes of repair, and since this period I

have taught that in all wounds, even to the amputation of the thigh, that like tissues should be coapted by the use of fine continuous sutures, even the skin itself, and the wound sealed with iodoform collodion. Primary union will supervene, drainage is not only needless, but is a positive disadvantage and danger.

DISCUSSION

Dr. Joseph A. Danna, New Orleans, La.—About seventeen years ago I had an unpleasant experience with kangaroo tendon and since that time I have not used it. At that time we were using kangaroo tendon for hernia operations. We used the heavy kangaroo tendon for the first row of sutures in the muscle and one continuous kangaroo tendon suture in the external oblique, and then the skin was closed with No. 1 kumol catgut in the subcutaneous fascia and fat, and under the skin line we used also another small catgut suture, and then for fear we might get infection, as we do not infrequently in these days, we used two or three interrupted silk sutures, so that if we had to open the wound the whole wound would not break down. One day after getting through with various ligatures I found I had the large-size kangaroo tendon suture left over. They say it would last from ten to fourteen days. Ten days is not long enough for me. It lasted six days. Alcohol was applied to the surface of the wound. The kangaroo tendon which was buried under the skin did not hold. The kumol catgut still held. There must have been something wrong at the start about its lasting forty days, and I have hesitated to use kangaroo tendon after that. If Dr. Marcy will furnish me with some particular brand of kangaroo tendon which is proof against that sort of thing I would be glad to use it.

Dr. James M. Mason, Birmingham, Ala.—I have used a good bit of kangaroo tendon but have practically abandoned it in favor of catgut. The reason is that the manufacturers of catgut have steadily improved their product while the manufacturers of kangaroo tendon have let that steadily deteriorate. The small sizes of kangaroo tendon are too ragged

and too brittle, and the larger sizes, likewise ragged and comparatively brittle, make a knot so large that it nearly always gives trouble in wound-healing. If Dr. Marcy will tell us where to obtain more satisfactory kangaroo tendon I am sure many of us will return to its use.

Dr. Marcy (closing the discussion).—The story of animal sutures is a long one and I shall not go into it at this time. Of course it is very important that you have good tendon. At first I had great difficulty in securing the kind of tendon I wanted for my surgical work.

Dr. Long.—You have not answered the question as to where we can secure the right kind of tendon. Do you put it on the market for sale yourself? If not, what manufacturer does?

Dr. Marcy.—If any of you want kangaroo tendon write to me and I will get it for you at wholesale price. The tendon is manufactured under my supervision.

OPERATION FOR DIAPHRAGMATIC HERNIA

By Harvey B. Stone, M.D.
Baltimore, Md.

The subject of diaphragmatic hernia has received extensive attention within the last five years. As many writers have suggested, this increased interest in what was formerly considered a very rare condition is due to two factors—the increased use of the roentgen ray as a method of diagnosis and the numerous war wounds of the diaphragm which were followed by diaphragmatic hernia.

It is not the purpose of this article to enter into an extensive review of the literature on this subject. A very recent article by Truesdale[1] reviewed the subject quite completely and carried with it a bibliography of the recent literature. In addition to this an article by Frank[2] contains a further extensive collection of references. As a medical condition becomes recognized with increasing frequency, interest shifts from its rarity and is diverted to the question of treatment. The purpose of this paper is to call attention particularly to the best method of procedure in dealing with this type of hernia.

There have been in general three methods of operative approach employed—the abdominal, the thoracic, and the combined abdominal and thoracic. The combined approach has been described chiefly in the French literature, particularly by Auvray.[3] His is a much more formidable operation than the one which the present writer wishes to advocate and will be considered in detail a little later.

To present the facts on which this paper is based the following case is briefly outlined, special emphasis being placed upon the operative difficulties encountered and the conclusions derived from them:

A soldier, S. L., was admitted to Base Hospital 18, A. E. F., March 2, 1918, with definite signs of acute intestinal obstruction of three days' duration. There was no history of wound or any other injury and no marks or scars on his body. An exploratory laparotomy was done through a lower right rectus incision by Dr. Charles H. Watt, one of the officers on the surgical service. The small intestine, the ascending colon and the transverse colon were found to be distended, while the descending colon and sigmoid were found collapsed. The distended bowel was traced around to the neighborhood of the splenix flexure. At this point the bowel seemed to be caught in some manner not easily determined because of its inaccessible position from the incision. Traction was made on the distended bowel, without great force being used, and the obstruction was felt to give away, following which gas and liquid contents moved down into the descending colon. It was felt that the obstruction was definitely relieved, and while the precise nature of the trouble could only be surmised it was supposed that adhesions which had kinked the bowel had been released or a volvulus untwisted, thus freeing the obstruction. The incision was closed and the patient progressed fairly favorably for several days, when the obstruction again returned accompanied by distention, crampy pains and vomiting.

The fact that the trouble had been in the splenic flexure, close under the diaphragm, then suggested that the case might have been one of diaphragmatic hernia. Dr. C. G. Guthrie, chief of the medical service, examined the patient in consultation and found a tympanitic area in the left chest. Feeling quite sure that the case was a diaphragmatic hernia

we proceeded to have a fluoroscopic examination made by Dr. Charles A. Waters, which showed a definite dome-shaped mass, above the diaphragm in the left side of the chest, which descended with inspiration. It was at once decided to operate on the patient, and this time operation was done by the writer, with the help of Dr. Watt, on March 7, 1918. A high left rectus incision was made and the splenic flexure was found to pass into the chest through a small hole in the dome of the left half of the diaphragm. The bowel was very tightly incarcerated in the opening through the diaphragm and did not yield to very determined efforts to draw it downward. In short, we were confronted with an irreducible hernia.

It was evidently necessary to divide the edge of the diaphragmatic aperture so as to release the incarcerated bowel. However, this proved to be a very formidable task. The point to be reached was high up under the dome of the diaphragm. The costal margin was in the way, and distended bowel further complicated the difficulties. The neck of the hernia could not be seen, and to pass a knife upward and cut by blind touch was regarded as an extremely dangerous procedure. Before the operation it had been considered wise to prepare the patient's chest as well as his abdomen, with the possibility in mind that it would become necessary to open the chest. When the condition just described was found, it was decided without further delay to do an immediate thoracotomy. The left hand was kept in the abdomen and pushed upward against the chest wall at the level of the hole in the diaphragm. This enabled the operator to judge exactly which rib would give best access to the part of the diaphragm in which the hernia was situated. This rib, which turned out to be the sixth, was then exposed by a six-inch incision along its course. The rib was resected subperiosteally and the left pleural cavity was opened. Immediately the strangulated loop of bowel,

which happened to be the splenic flexure of the colon, was presented to view. Another effort was made to reduce the bowel, by traction with the left hand in the abdomen and pressure with the right hand in the chest. This again failed. Then the index-finger of the left hand was used to lift the diaphragm upward toward the incision in the chest wall, pushing upward under the diaphragm, just at the edge of the defect. With the knife in the right hand the margin of the defect was carefully divided, the left hand acting as a support and guard underneath, doing away with any danger of cutting into abdominal viscera. This permitted the easy reduction of the loop of bowel. The reduced splenic flexure was then carefully examined and found to recover its color quickly, and was considered to be perfectly safe to replace in the abdomen. The edge of the defect was also examined. The hernia was of the so-called false congenital type. That is to say, there was no sac and the pleura and peritoneum were continuous across the smooth, rounded edges of a hole about $1\frac{1}{2}$ cm. in diameter. The hole was now closed with interrupted sutures of catgut. This closure was also greatly facilitated by having the two incisions. The sutures were placed from above through the thoracic incision, but the left hand was kept in the abdomen supporting the diaphragm from below, so as to bring it well up into the wound, and also acting as a darning ball to prevent the stitches catching any of the abdominal contents. Both the chest and abdominal incisions were then closed without drainage. The patient made an uninterrupted recovery in the same length of time that would be required for any other ordinary abdominal operation. A dry pericardial rub, lasting a few days, and some evidence of pleural thickening did not delay his convalescence.

The case herewith reported has already received passing mention in the literature, being referred to by Jopson in a discussion of the paper by Matthews and Imboden.[4]

To resume the consideration of the best operative attack

in cases of diaphragmatic hernia: The abdominal approach has certain definite advantages. It affords necessary knowledge as to the condition of the abdominal viscera and permits the performance of any resections, repair or suture that may be required by the condition of these viscera. In all cases of hernia which come in with acute intestinal obstruction, and in those traumatic cases in which a missile has traversed the chest and diaphragm and then penetrated the abdomen, it may be considered absolutely essential to explore the abdomen. With these definite features in its favor it has equally definite drawbacks. The dome of the diaphragm is mechanically very inaccessible from below. The reduction of the hernia is rendered difficult not only by this mechanical situation, but also by the suction of the negative pressure in the chest and by possible adhesions within the thorax, and the suturing of the defect presents the unfavorable mechanical features of a closure done on the concave rather than the convex surface of the diaphragm. The thoracic approach, alone, has the advantage of a much more immediate access to the site of the trouble and does away with the negative pressure of the pleural cavity, and so makes reduction easier and gives a much better field for suture of the hernial opening. It might be the method of choice in those cases of congenital hernia not acutely obstructed which are diagnosed before operation. Until the present time, however, this has been by far the smallest group of cases which come to operation, the great majority being those with acute obstructive symptoms not diagnosed before operation and those following traumatism. As has just been pointed out, it is particularly in these classes of cases that exploration of the abdomen is so essential. It would be impossible, broadly speaking, to repair or even to recognize serious intra-abdominal lesions through the thoracic incision alone. Without going into numerous case references, it may be said that the literature of diaphragmatic hernia presents ample support for the statements just made.

The combined abdominal and thoracic approach obviously affords all the advantages offered by either method alone. As in the case herewith reported, it greatly facilitates the necessary steps of the operation, and at the same time gives opportunity for a complete inspection of the whole field involved. It was these considerations which led certain French surgeons to advocate the combined operation, notably Berard and Auvray. The latter has reported the use of an incision beginning as a thoracotomy, then continued downward over the anterior abdominal wall, dividing in its course the costal margin, the anterior abdominal wall itself, and the diaphragm down to the opening of the hernia, thus laying the two cavities broadly open by one extensive incision. While the principle of a double approach seems to the present writer to be the proper solution of the difficulties involved, nevertheless this particular application of it impresses one as being entirely too radical in its execution and unnecessarily damaging to important structures, particularly the costal margin. On the other hand, it does not seem to add a single advantage over the method herewith described, which consists of two simultaneous but separate incisions. As to possible disadvantages of the combined operation of the latter type, it might be urged theoretically that the opening of the chest added the collapse of one lung and possible additional shock to the burden which the patient has to bear. As a matter of fact, if the hernia can be reduced from an abdominal incision alone, the chest will be thereby opened, except in those few cases where there is a congenital hernia with a true sac, because the reduction of the hernia puts the chest cavity in communication with the outer air by way of the hernial defect and the abdominal incision. This is not a mere matter of assumption, but has been proved by the writer experimentally on dogs, in whom defects in the diaphragm were made, following which there was an immediate inrush of air into the pleural cavity on the side opened. Therefore the objection noted above

has no weight. The single remaining additional burden imposed on the patient by the combined operation is the trivial matter of an incision through the chest wall, perhaps with the removal of a piece of rib, which is quite unimportant compared with the advantages gained thereby.

It is not desired to give the impression that the combined approach is original. It has been accorded passing mention by Soresi[5] and others, usually with the implication that it may be employed as a last resort. The purpose of this article is to establish reasons why the simultaneous abdominal and thoracic attack should be considered the standard method of approach in the large majority of cases of diaphragmatic hernia.

Summary. 1. Abdominal exploration is essential in the great majority of cases of diaphragmatic hernia.

2. Thoracic approach greatly facilitates the necessary operative steps.

3. The method of choice, therefore, for the routine handling of these cases should be by combined abdominal and thoracic incisions.

4. These incisions are best made separately instead of by the French method of a continuous incision.

References

1. Truesdale, P. E.: Diaphragmatic Hernia: The Thoracic Approach, Ann. Surg., 1921, lxxiv, 347–354.

2. Frank, L.: Congenital Diaphragmatic Hernia, Ann. Surg., 1920 lxxi, 280–292.

3. Auvray: Bull. de la Soc. Chir., 1919, 698.

4. Matthews and Imboden: Tr. Am. Surg. Assn., 1920, xxxviii.

5. Soresi: Ann. Surg., 1919, lxix, 254.

HERNIA OF THE BLADDER WITH REPORT OF A CASE

By J. N. Baker, M.D.
Montgomery, Ala.

The following case of bladder herniation complicating an acute intestinal strangulation at the inguinal opening has served as a stimulus in preparation of this study of bladder hernia.

G. T., male, aged seventy-three years, laborer. On the morning of January 11, 1921, he arose and went to work as usual; about 9 A.M., he was suddenly seized with abdominal cramps, soon followed by nausea and vomiting; he was sent to his home and was first seen by me about noon of the same day.

A cursory examination of the abdomen was made. It revealed a rather large irreducible hernial mass in the right inguinal region, which according to the patient's statement had existed for more than twenty years, and which during the past four or five years could never be completely reduced by himself, as had been formerly the case.

The diagnosis—that of a strangulated hernia—being self-evident, he was sent at once to the hospital for operation. Owing to his age and the condition which had to be met—for the writer is strongly of the opinion that practically all strangulated herniæ should be operated under local anesthesia—novocain infiltration anesthesia was employed.

The usual hernial incision was made and the underlying tissues cautiously dissected down to the sac, which on being opened revealed a coil of small intestines tightly constricted near the deep abdominal ring. Upon release of this constriction the viability of the gut became apparent and the segment was returned to the abdominal cavity.

Attention was next turned to a dissection of the sac and the completion of a radical operation for the cure of the hernia. The dissection was begun from above and carried downward; at this stage of the operation the patient experienced considerable pain from the manipulations necessary to the separation of the large hernial sac and the scissors were freely used in order to minimize the pain and trauma.

The long standing of the hernia and the wearing of an ill-fitting truss had completely obliterated normal anatomical landmarks. Ere the operator was fully aware of what had transpired, a fair-sized cavity had been opened into, from which straw-colored fluid exuded. Further exploration revealed the dome of the bladder below and to the inner side, while a considerable pouch from the bladder—whose walls were markedly thinned out and forming almost a diverticulum—extended some two inches into the inguinal canal and constituted a part of the posterior inner wall of the hernial sac.

This herniated diverticulum-like portion of the bladder was resected and the vesical opening closed with a double row of chromic catgut sutures. The dissection of the sac was then completed and the Bassini type of closure used to complete the operation. A cigarette drain was inserted through the lower angle of the wound down to the bladder incision; this was removed at the end of forty-eight hours, as no leakage of urine had taken place.

The postoperative behavior of this patient was quite uneventful; the wound healed by first intention throughout and he was discharged from the hospital at the end of two weeks.

Further inquiry into his past history revealed the significant fact that he had had, for several years, much difficulty in voiding, together with increased frequency, more especially by night. The prostate showed a moderate, though not marked, hypertrophy; no cystoscopic studies were made. When last seen, some three months after the operation, marked improvement had taken place in the vesical symptoms.

Actual hernia of the bladder, while not commonplace, is by no means a surgical curiosity. If one accepts the classification of Brünner and of Eggenberger—of dividing bladder herniæ into two groups, those which are manifest and those which are latent—we have a condition which is by no means rare, and one which every surgeon whose hernial work is at all extensive has likely encountered more than once.

Karewski made extensive experiments upon the cadaver and demonstrated that there is a close connection between the hernial opening and the bladder coverings in persons of all ages without displacement of the bladder or lipoma and without any abnormalities of the organ. Even slight traction, as in high ligation of the hernial sac, without previous careful dissection of the peritoneum and prevesical fat, may produce a bulging of the bladder wall sufficient to cause this to be incorporated within the grasp of the ligature and subsequent vesical fistula result. This is particularly true in large hernial openings, in old ruptures, in herniæ of the direct type and in recurrence of hernia after operation.

As to the frequency of bladder hernia quite a divergence of opinion exists. In a collection of 1841 operations for various types of hernia, Brünner found 16 which were complicated with cystocele, or a little less than 1 per cent. Eggenberger's statistics show 75 cystoceles in 6778 operations, or 1.1 per cent. Lucas Championnière reported 6 in 900 operations, or 0.7 per cent. Coley in his large experience has encountered 14 cases (1909).

As regards age and sex, Eggenberger's table shows 241 cystoceles, 168 being in the male and 73 in the female; no cases of bladder hernia have been observed at the age of puberty. In men, these herniæ occur most frequently between fifty and sixty years of age; in women, between thirty and forty years. Brennisen gives the proportion of male to female cases as 3 to 1; Eggenberger as 3 to 2, and in Coley's personal experience the ratio has been 7 to 1.

Of 38 cases of bladder hernia in the female, reported by Eggenberger, 15 were inguinal and 23 femoral; of the inguinal, 10 were on the right side, 4 on the left side and 1 uncertain; of the femoral, 10 were on the right side, 10 on the left, 1 double and 2 uncertain.

Eggenberger states that the majority of bladder herniæ are, in fact, false herniæ, as they either have no peritoneal sac at all or the bladder is found *alongside* the hernial sac instead of *within* the sac. According, therefore, to the manner in which the peritoneum is involved in these bladder herniæ, he differentiates three varieties, viz.:

(*a*) Extraperitoneal.

(*b*) Paraperitoneal.

(*c*) Intraperitoneal, or true bladder hernia.

Classification (*b*)—the paraperitoneal type—represents by far the most common variety, and of these he reports 73 cases: 43 external, 8 internal, inguinal; 21 femoral and 1 perineal. The case reported above falls into this group. In this type of bladder hernia that portion of the viscus which has peritoneal covering is continuous with the posterior and inner portion of the true hernial sac; indeed, in some cases, it really forms this portion of the sac, a dissection of which, without injury to the bladder, becoming an exceedingly difficult if not impossible task. The important point in such a dilemma is to recognize the presence of the bladder before its penetration and to trim the peritoneal attachments of the sac from this organ.

Of type (*c*)—the intraperitoneal or true bladder hernia—

Eggenberger was able to find but 1 case reported in ten years. Brünner's statistics show 5 such cases.

As regards the genesis of bladder hernia, both Eggenberger and Sonnenberg are inclined to consider pathological conditions within the bladder and pelvis—such as prostatic hypertrophy, stricture and gravidity—as important contributing factors. Hyperplasia of the fatty layers, because of its frequent prominence in many of the cited cases of vesical hernia, has often been considered as a probable contributing etiologic factor. Monod and Delagenière, as well as Lotheissen, consider this a constant phenomenon in bladder hernia. In 50 per cent of Eggenberger's reported cases special mention is made of an unusually large amount of fat or a lipoma. Yet the position as to just why this condition, even though a frequent finding at operation, should be viewed as an etiologic factor, has not been logically defended.

The incidence of bladder hernia is much greater in the male than in the female, by reason of the fact that the paraperitoneal type is the one most frequently encountered, and this form is almost always accompanied by an inguinal hernia to which the male is exceptionally prone. No case of congenital bladder hernia has been reported, the youngest case being eighteen months.

The preoperative diagnosis of bladder herniation, judging from published statistics, is made with chagrining infrequency. That the very small, latent and symptomless type should go unrecognized, prior to operation, is not to be wondered at; yet even at operation we may often fail in recognition of the true condition. According to Alessandri's table of 223 reported cases the diagnosis was made 18 times without being confirmed by operation or postmortem examination; 25 times a vesical hernia was found on autopsy; in but 5 cases was the condition recognized before operation; in 147 during operation and in the last series, the bladder remained intact in only 11 instances.

Bladder herniæ of even moderate size and duration rarely fail to give rise to vesical symptoms. Sometimes the bladder may be emptied in two stages; in the first the bladder itself is emptied; in the second the herniated portion. Or again, the urine may be voided in driblets much like that of the confirmed prostatic. The case herein reported presented for several years increased difficulty in completely voiding, as well as a globular mass in the inguinal region which was never completely reducible. These suggestive facts, owing to the urgency of the strangulation, were not ascertained, however, until after the operation. Many, if not actually incarcerated, are not completely reducible and even after the concomitant intestinal or omental hernia has been reduced, there yet remains a small, slightly oval, doughy tumor. Should the bladder be distended with fluid, the size and shape of this tumor may be made to change and fluctuation elicited. In a suspected case the cystoscope should always be used and the relation of the displacement to the location of the hernia established.

During operation one or more unusual conditions may present, any one of which should arouse suspicion.

(*a*) The first and most important is the presence of an unusual amount of extraperitoneal fat in the inguinal canal; this should be liberated and not included in the ligature encircling the neck of the sac. Coley in his unusually large operative experience, by observing this rule, has never done violence to the bladder.

(*b*) The hernial opening may be, and usually is, of very large size and out of proportion to the amount of herniated intestine or omentum.

(*c*) The presenting hernia is most often of the direct type.

(*d*) Much difficulty may be encountered in separating the hernial sac, more specially the inner posterior portion, from which free bleeding is likely to ensue if the bladder be involved.

(*e*) Identification of the bladder musculature, which, if

normal, may readily be done; if thinned out and attenuated, as is frequently the case, identification is made difficult and the similarity to that of a hernial sac correspondingly increased.

Bladder herniæ, as a rule, are irreducible. Reverting again to Eggenberger's compiled statistics, we find that out of 110 cases only 19 were reducible, 10 partially reducible, 33 irreducible, 16 incarcerated, and concerning the remaining 32 no accurate data are given. Practically all inguinal herniæ of the bladder are associated with either intestinal or omental herniæ, and if the operation is an emergency one for the relief of an acute strangulation and if the herniated bladder be incarcerated, injury to this organ is almost sure to occur. No serious harm should result even though the bladder be wounded, provided the mishap is promptly recognized and properly corrected. The most serious trouble has arisen from unrecognized injury to the smaller bladder herniæ from either the inclusion of the bladder wall within the ligature placed about the sac, or else from actual damage done the bladder wall during the sac dissection, without proper repair. Here the mortality has run from 30 to 40 per cent.

Practical Deductions. The possibility of bladder involvement should always be suspected and due caution observed:

(*a*) In all large inguinal herniæ, more specially those of advanced life and in those manifesting prostatic hypertrophy or other signs of crippled bladder function.

(*b*) In all direct inguinal herniæ, regardless of size or age.

(*c*) In all operations for recurrence of hernia for two reasons: (1) Recurrences are notoriously of the direct type. (2) Adhesions and distortions of the neck of the sac from the former operation, resulting in a possible pull on and displacement of the bladder.

(*d*) In all herniæ presenting an undue amount of fatty tissue closely associated with the sac, at or near the *fovea*

inguinalis medialis, the possibility of injury to the bladder is increased and this danger signal should never go unheeded.

DISCUSSION ON THE PAPERS OF DRS. HARVEY B. STONE AND JAMES N. BAKER

Dr. J. M. Mason, Birmingham, Ala.—I want to emphasize one or two points brought out by Dr. Baker that have been impressed upon me by seeing a number of cases of bladder hernia. In direct hernias in old men with relaxed abdominal muscles and probably with some minor obstruction, where the bladder is inclined to be constantly overfilled, it is easy for the bladder to flatten out and to slip over into the inguinal region. In operating in cases of this type we must look out for hernia of the bladder. In such patients if the sac is very thick or bleeds freely it is quite likely that we are dealing with the bladder wall and should proceed very cautiously.

Another point concerning Dr. Stone's paper. He mentioned putting one hand in the abdomen, pressing up on the diaphragm and approximating a given point to the thoracic wall so as to tell which rib to excise. That this is very helpful I found in one instance of a bullet wound of the left chest. The roentgen ray showed the bullet near the diaphragmatic attachment to the ribs and so close to the pericardium that it moved up and down with each heart-beat. We were uncertain whether the bullet was in the pericardium low down or in the diaphragm. By making a left rectus incision, introducing one hand into the abdomen and pressing the diaphragm against the chest wall, we held the bullet against the ribs, cut down on it and removed it.

Dr. Winslow.—Where was the bullet?

Dr. Mason.—It was between the diaphragm and pericardium, embedded in the diaphragm but not projecting through it. We had to remove the cartilage of the sixth and seventh ribs to remove the bullet.

Dr. Ernst Jonas, St. Louis, Mo.—I have resorted to the procedure advocated by Dr. Stone repeatedly, not in cases of

hernia as he reported, but in chronic cases of subdiaphragmatic abscesses resulting either from gallstones or from the appendix. We have made it a rule in these cases to plan the operation in a similar way to what Dr. Stone has advocated from the beginning. In that way we think we can avoid the possibility of having to go in again after doing the abdominal operation. Frequently, as one knows, there is only a small communication between the subdiaphragmatic abscess and a chronic empyema which has resulted from the subdiaphragmatic abscess, and if one does the operation that Dr. Stone has advocated he is fairly sure he has cured the patient in one step. This operation is easily done under local anesthesia.

There is only one little point I should like to make in connection with Dr. Stone's technic, and that is it is perhaps better to make a transverse incision about the cord and below the margin of the rib. In that way we get a freer exposure and can look the field over carefully.

Dr. Francis R. Hagner, Washington, D. C.—Some years ago a prominent surgeon in Washington operated on a child but did not obtain as good a result as the essayist reports in his case. The hernia of the bladder was not recognized. It was considered to be a cyst, which was opened, drained and the child sewed up. The child died and at autopsy a hernia was found.

As a causative agent of hernia prostatic obstruction is a strong factor. If one looks over our cases of prostatic obstruction he will find in a large percentage of them a history of hernia coming on late in life and specially in patients who have gradually increasing obstruction in the effort of emptying the bladder.

Dr. Herbert P. Cole, Mobile, Ala—The question of using local anesthesia in these cases is interesting to me and I should like to speak a moment on that subject, giving a record of the observations I have made on the use of local anesthesia in strangulated hernia.

Dr. Stone's case, for instance, presenting features that it did, could have been performed under local anesthesia. We carry out local anesthesia on certain aged cases and certain cases with shock coincident with prolonged obstruction. We do it to reduce the mortality factor. Any procedure that will

aid in the reduction of mortality is valuable. We know that under general anesthesia in exposing the strangulated intestinal area it becomes a question whether or not there should be a resection. We know, especially in the aged and old cases of strangulation, that this added factor of resection increases the mortality rate.

I have had occasion in the last few years to have operated on 4 cases in aged individuals under local anesthesia. I made careful and thorough observations and so far as I know original. I present it to you in the hope that it may be further carried out. In general anesthesia there is very little or no peristalsis in the intestine on stimulation. Under local anesthesia, with the strangulated area presenting, if one obtains peristalsis in the strangulated area by tapping the strangulated region he can feel satisfied to put the cyanotic portion of the gut back into the abdomen without resection. On four occasions that little point of sufficient peristalsis on slight traumatism to the strangulated area has convinced me that resection in these aged cases could be obviated. That may be a determining factor in some cases in lowering the mortality rate.

Dr. James K. Simpson, Jacksonville, Fla.—About two years ago I had an experience which convinced me that Dr. Stone's method of dealing with double diaphragmatic hernia renders repair rather easy. My incision was planned for me by one negro against another. These negroes were at a dance and following it there was a razor fracas, during which one negro made a transverse incision through the thorax with a razor and likewise a transverse incision through the abdomen. The first transverse incision cut through the diaphragm into the fundus of the stomach and most of the fundus of the stomach had herniated through the diaphragmatic wound. I sought to repair the incisions the negro had made. I tried to pull the stomach up through the diaphragmatic wound sufficiently to close the opening in the fundus, which was quite small. I replaced the stomach in the abdomen and with one hand in the abdomen I was able to push the diaphragmatic hernia through the other costal incision, having enlarged the costal incision, and the closure of the diaphragm was an easy matter. I put in a little drainage in the chest, closed the chest wound and the man recovered.

Dr. I. S. Stone, Washington, D. C.—In view of Dr. Baker's interesting paper I should like to refer briefly to one case. The patient, a woman, nearly eighty years of age, had a hernia for a number of years which had never received the attention of a physician. She came to see me on account of the enlargement of this hernia, which was a right direct inguinal hernia of the omentum, with a portion of the bladder incarcerated with it and accompanied by great pain. She was brought fifty miles on the train, and notwithstanding that was in excellent condition. We opened up on the right side and found here a condition of affairs which had existed for so long a time that some of the tissues seemed almost as hard as cartilage. The omental condition was fully understood and separated and a large portion excised. But what appeared to be a cyst adjoining proved to be the bladder, which contained straw-colored urine. I believe now the patient had a diverticulum of the upper right aspect of the bladder.

I desire to refer to another variety of hernia associated with the intestinal or any other structures in the inguinal regions. A hernia of the bladder can be almost as complete through the vagina anterior to the uterus as elsewhere with the uterus in place. The entire bladder may be projected through the vulva. Examination through the rectum shows the bladder out of its normal position. Gynecologists call these hernias.

Dr. Robert T. Miller, Jr., Baltimore, Md.—In cases of direct traumatism of the abdomen or of intestinal obstruction of obscure origin—in other words, in the event of an apparent abdominal lesion of uncertain character and location—we are forced to adopt exploratory laparotomy as the safest course, being guided in the further management of the case by the abdominal findings. If a diaphragmatic lesion is found the immediate addition of a low intercostal incision on the appropriate side giving direct access to the diaphragmatic dome will aid materially so far as the mechanical features of the operation are concerned. If we were able to make a diagnosis correct in all details without an exploration, it seems altogether probable that we would elect an approach through the chest in a certain proportion of the upper abdominal lesions; as a matter of fact the direct drainage of a subdiaphragmatic abscess through a protected pleural cavity illustrates very well the advantages of this approach. This statement is based

upon an admittedly meager experience, but I think it will hold good. I was much impressed by one case we had in France in which there was a shell wound involving both the abdomen and chest with the prolapse through the diaphragm of quite a few loops of intestine; the ease of replacement when working from above through the chest was very striking. Some recent experimental work has been quite convincing in this respect. If we know we are dealing with a diaphragmatic hernia there hardly seems room for debate as to whether or not one should make the most direct approach to the hernia and the constriction at its neck as we do in all other types of hernia when it is possible. When approached from above the hernia is readily reducible, closure of the diaphragm is rendered relatively simple and the patient does not suffer the disadvantages of an incision in the anterior abdominal wall and the consequences, sometimes grave, of forcible intra-abdominal manipulation.

Dr. P. E. Truesdale, Fall River, Mass. (by invitation).—It is a privilege to have the opportunity of listening to such excellent papers. The prevailing note throughout this meeting has been the use of plain common-sense in the application of the principles of surgery.

My interest in diaphragmatic hernia has centered about its occurrence in children. Two cases have come under my observation. Both little patients were run over by automobiles. In each instance the wheel passed over the upper abdomen. They presented the same clinical picture, except at operation the extent of the laceration in the diaphragm was greater in one than in the other, and that made an entire difference in the course to be pursued at operation. In the first the tear in the diaphragm was unilateral, on the left side, and was approached by thoracotomy. The second patient had a bilateral rupture which was sutured through an abdominal incision.

In looking over the literature I found some of the most valuable contributions on hernia of the diaphragm in the *Transactions* of this Association. I believe that the inspiration from these papers, together with what little experience I had had in thoracic surgery during the war, encouraged me to operate upon one of these patients by the thoracic approach. The contributions of Dr. Stuart McGuire and Dr. Davis appeared

in the *Transactions* of this Association in 1912 and 1913. Dr. Davis operated for traumatic wounds and Dr. McGuire operated for diaphragmatic hernia occurring as the result of external violence. The thoracic operation which was done by both of these surgeons was almost contemporaneous with the earliest operation performed by French surgeons.

The combined operation advocated since and referred to by Dr. Stone is a very radical procedure. A long intercostal incision is made, opening the thorax and extending down the left rectus, splitting the diaphragm down to the tear. Suturing is then more easily accomplished, but the method necessarily would augment the risk, particularly when applied on the very young. Dr. Stone's operation based on the bimanual principle is much to be preferred. However, we have to bear in mind that the more extensive the lesion the more serious the condition of the patient and the more speedy must be the operative effort. This is particularly true in children. One must do the surgical work as quickly as he can with safety. I selected the thoracic approach and was entirely deceived as to the position of the diaphragm. I made the incision between the seventh and eighth ribs. It was much lower than I thought I would find it and was in the form of an inverted disk. I found the small intestine, colon and stomach in the thoracic cavity. These thick coils passed through the opening in the diaphragm and were constricted so that it was almost impossible to reduce them. The reduction was made by grasping one edge of the torn area with two fingers and lifting it, thus producing a vacuum in the abdomen. The bowel thus slipped back into the abdominal cavity without much difficulty.

One of these youngsters had a recurrence nine months after operation. He was brought to the hospital on account of acute intestinal obstruction. Upon opening the abdomen I found the stomach and small intestine in the abdominal cavity and a loop of the splenic flexure caught in the wound at the site of the rupture of the diaphragm. A speedy operation for relief of the obstruction was done. I did not meddle with the condition that existed at the point of obstruction but performed a cecostomy only. Later on I shall have to deal with the obstruction in the region of the diaphragm. There naturally arises again the question as to whether the next operation should be thoracotomy or laparotomy. I shall take the advice of Dr. Guerry, so well presented in his paper yesterday, and

try to make a judicious selection of a method to meet the circumstances in this particular case.

Dr. L. E. Burch, Nashville, Tenn.—I have had 2 cases of hernia of the bladder and failed to recognize the condition in both cases and never had the courage to report these 2 cases until I heard the statistics brought out in the paper of Dr. Baker.

The first case was one of direct hernia in a young man of eighteen. The second was in a female, twenty-four years of age, of the femoral variety. In both of these cases the bladder was penetrated before I recognized where I was. The bladder was closed with sutures; no drainage was used and there was no trouble thereafter.

While I have had 100 per cent failures in recognizing the bladder I feel there is no excuse for it. If one will simply keep his wits and remember the thickness of the bladder wall, and especially the arrangement of the bloodvessels, the accidents should always be avoided.

Dr. A. C. Scott, Temple, Texas.—I have been very much interested in both of these papers, but it seems to me the one on diaphragmatic hernia is the one that received the most attention. The other one, however, seems to be the one of greatest interest because of the fact that the condition treated of in Dr. Baker's paper is one which is probably much more common than any of us would imagine. I am sure, since hearing this paper, I have had many cases of paravesical hernia which were really not recognized. No doubt all of you will recall that in opening the aponeurosis from the external inguinal ring up very often the tumor mass will rise up in the wound, and I find, as I think back over it now, I have been unable to satisfy myself as to whether many of these cases which I am sure I have had were really hernias existing; that is, many of them were cases in which probably the bladder was not up in the wound or not constituting a real hernia until the external oblique was opened, permitting the whole thing to roll out. As I look back on many of those cases I realize that I have had a good many that I did not recognize. I did not remember to have reported any of them as vesical hernias, although I have found the bladder sticking up with the hernial mass in many instances.

It recalls to mind the necessity of following up the admonition

of the American College of Surgeons in making our records as complete as possible in the matter of detail. If we only had records dating back ten to twenty years, such as we have been keeping in the last four or five years, I am sure we would be able to go back and determine the existence of many cases with complications of this kind of hernia that our records show nothing about at the present time. Out of something like 700 cases of inguinal hernia we have never wounded a bladder but once, and I must confess that in that case I opened the bladder wide and had urine running over everything before I recognized the error I had made. That case fortunately was sutured and no ill results came from it. But we had two sacs facing us and they were side by side, and not until one was opened did we discover it was the bladder instead of one sac.

I was very deeply impressed with one of the points brought out in connection with the fact that these vesical hernias are liable to be associated with direct hernia. You can understand why that is. When the conjoined tendon is almost absent or frayed out until it amounts to little or nothing the bladder is practically pushed forward and there is nothing that can be kept back very much. You notice also that the fat is much more bound down in that sort of case, and that is the kind of case in which difficulty in bringing about a radical cure is so often met with. I dare say in the direct hernia, with a very weak conjoined tendon, the cases are much more common than in any other class. That brings to my mind the method of handling these cases which was developed by one of our Texas men, a young fellow who is an associate of Dr. Thompson, of Galveston, I refer to Dr. Singleton. I am not quite sure whether he originated the idea or not, but I got the idea from him of supporting these tissues with fascia lata transplanted and put in as a substitute for the missing or weak conjoined tendon. I am quite sure if we were to notice our cases more carefully in detail we would find that we have a much larger number of hernias in which the bladder is involved than we have been finding in the past. We have been pushing the fat in the bladder back and getting along without having much tension whether the bladder was involved or not so long as we did not open it.

Dr. Randolph Winslow, Baltimore, Md.—In reference to hernia of the bladder I think it is much more common than

we have heretofore thought. I have seen 6 cases, in 2 of which I went into the bladder. One I absolutely did not recognize and the other I thought was a cyst.

The points I wish to bring out particularly is what Dr. Scott said a moment ago: (1) The great frequency of proximity of the bladder in cases of direct inguinal hernia; (2) when one finds a mass of fatty tissue or thickened tissue at the inner side of the sac he had better let it alone; (3) if one finds what he thinks is a cyst he had better let the cyst alone. Fortunately in the cases in which I opened the bladder no harm was done. The patients recovered.

Dr. John Wesley Long, Greensboro, N. C.—We have it on the authority of the late Dr. John B. Murphy that statistics show that hernia of the bladder occurs as a complication of inguinal hernia on an average of once to every fifty cases. Another important fact to remember is that in intestinal hernias two sacs rarely ever appear through the same opening. If in inguinal hernia there are two sacs the assumption is that one of them is the bladder.

Dr. Stone (closing on his part).—I quite agree with Dr. Jonas that the method of combined approach may have a wider application than in the case of diaphragmatic hernia, and I think that my one experience would lead me to rely on it.

As to the use of the transverse instead of the vertical abdominal incision I was simply controlled by habit. I have been accustomed to make vertical incisions and I have had little or no experience with the transverse one. So I did not think of it.

With reference to the remarks of Dr. Cole, I would say that it was quite possible to do this operation under local anesthesia. There is nothing that is not simple about the operation. Two incisions are made instead of one, and those can be made quite well with local anesthesia. The reason it did not occur to me to do that was that we were working under considerable pressure at the time, and local anesthesia prolongs the operation, and our machinery was geared to ether so that we used ether. It might have great advantages to use local anesthesia in cases in which we want to watch the condition of the bowel for a while to determine its viability in strangulated diaphragmatic hernia.

Dr. Miller and Dr. Truesdale have both raised the question as to whether it would be much better to do the work through the thoracic approach. I am willing to grant that is true in some cases, and did mention it in the body of the paper. Those cases which can be diagnosed as diaphragmatic hernia before operation, in which there has been no previous traumatism to the abdomen and no acute obstruction of the bowel, should I think be attacked by the direct thoracic approach alone; but until the present time they are distinctly in the great minority of cases which come for operation. Most of the cases seen are of two types: (1) Acute intestinal obstruction—patients who come in with obstruction and not as cases of diaphragmatic hernia, and (2) the traumatic types, in which one has always the possibility of a traumatic abdominal lesion as well as a diaphragmatic lesion. I still feel that exploration of the abdomen in these cases is essential.

I am very glad to have had Dr. Truesdale discuss this paper because I read his article of recent date with much interest. I felt after reading it that he had been happy in his choice of an abdominal approach in one of his cases and the thoracic approach in the other, and as it turned out they were happy methods of approach in each instance. However, I was left with the feeling that if one were going to generalize he could not depend on either of these alone and would have to rely on the combined approach as a standard method in most instances. I further feel that no one could pass on the critical condition of anyone else's patient; therefore it would be ridiculous for me to suggest that in his case it would have been possible to do the combined approach; but unless the patient is really desperately ill the simple addition of a laparotomy to a thoracotomy, or *vice versa*, as the case may be, does not add a tremendous increased mortality to the operation.

Dr. Baker (closing the discussion).—Just a word in reference to the etiologic factor mentioned by Dr. Hagner. The paper deals with the genesis of bladder hernia which I did not read, but that part will be published in the *Transactions*. I feel intravesical lesions play a rather important part in the production of bladder hernia in the latter portion of life. However, there seems to be a divergence of opinion on this point. Dr. Coley, to whose opinion we must attach great weight when it comes to any question of hernia, thinks intravesical lesions

play no part. Some of the German writers, especially, disagree with him and state that these lesions may figure conspicuously.

The point made by Dr. Cole as to the use of local anesthesia in dealing with these cases is a very good one. I feel strongly that all strangulated hernias should be tackled and finished, if possible, under local anesthesia.

As to the points brought out by Dr. Scott, I tried to stress them in my paper, namely, the fact that we should always have our eyes open in any direct hernia and think of the possibility of bladder injury before we actually cut into this organ.

Dr. Long made the statement that bladder hernia occurs in 2 per cent of cases. The literature shows that bladder hernia occurs in about 1 per cent of cases and that incarceration of the bladder within the sac is frequent. In the case herein reported the bladder was incarcerated and the intestinal loop was strangulated.

THE FINAL RESULTS IN 183 CASES OF MYOMA OF THE UTERUS AND MYOPATHIC BLEEDING TREATED WITH RADIUM

By C. Jeff Miller, M.D.
New Orleans, La.

No abdominal operation has reached a higher degree of technical perfection and has given a more satisfactory postoperative history than hysterectomy, as usually performed, for myoma of the uterus. It is generally conceded that the results, both primary and secondary, hardly permit of improvement. For these reasons the surgeon is loath to admit that any other method of dealing with myoma of the uterus and hemorrhage of myopathic origin can compete with the already standardized surgical procedure. Any other method must display properties rarely possessed by a therapeutic agent. The results obtained by such a remedy must show that the relief is permanent, is safer than operation, and gives a higher percentage of preservation of physiologic function than by an operation performed by a skilful surgeon.

That we possess in radium such a therapeutic agent, and that it will eventually supplant surgery in a large percentage of cases now treated by operation, I propose to prove by submitting the final results obtained in 183 cases observed over a period of seven years. Since early in 1914 to July, 1921, 230 cases were treated by radiation, but satisfactory records are available in only 183 cases. These records are

of value chiefly because of the time that has elapsed since radium was applied. There is scant reason to dwell upon the effects of radiation or the primary clinical results, as these features are already permanently established and about them there is little doubt. Since it may be inferred that I may be overenthusiastic in regard to the use of radium, I will make this point clear by stating that during the same period nearly an equal number of cases have been treated surgically, hence it can be readily shown that I clearly appreciate the limitation of radiation and am by no means insisting that it can sup-plant surgery in the above-named conditions.

The age of the patient, the type and situation as well as the size of the tumor, the condition of the appendages, evidence of previous infection, and general condition of the patient are all factors to be carefully weighed in determining the method to be advised.

Surgery is unquestionably the procedure of choice in young woman who present definite growths causing excessive bleeding, submucous growths or cases in which suspicion exists of malignancy of the fundus of the uterus. In this type conservative surgery is decidedly less radical—a point that cannot be too strongly emphasized.

In order to induce shrinkage or disappearance of the myoma it is necessary to produce at least a temporary cessation of menstruation, and the dosage of radiation has not been controlled to the extent that a temporary suppression can be foretold with a degree of accuracy necessary for justifying its use when conservation of function is of primary importance.

Therefore, in this group, when definite single tumors are present, the patient should be persuaded that operation offers a chance for myomectomy. In small multiple growths, when it can be definitely established beforehand that hysterectomy will be necessary, radium should be given the preference.

The most striking feature revealed in the review of both the cases treated by surgical intervention and by radiation is the increasing percentage of myomectomies performed. The prevalent idea that myomectomy is attended with a high mortality, and that second operations are necessary in too large a percentage of cases to warrant conservatism, is not sustained by the results obtained by competent surgeons.

The decision to adopt myomectomy in many cases formerly subjected to hysterectomy was prompted by the assurance that radium could eventually complete the cure if myomectomy failed to control hemorrhage. With such assurance the scope of conservative surgery has been materially widened and the number permanently relieved and the percentage of pregnancies that subsequently occurred further justified the conclusion.

Large myomata should be treated by myomectomy or hysterectomy. Unless some contraindication to operation exists there is no valid reason for the use of radium.

Massive growths too often present serious complications, such as adhesions, salpingitis, degenerative changes and pressure symptoms, to depend upon radiation as the treatment of choice. It has a distinctive application, however, in this group, in that it will promptly control hemorrhage until such improvement in the patient's general condition will render her a safe operative risk. As a preliminary measure it is a more valuable adjunct to surgery, but it should seldom be the elective treatment in myomata larger than a three and one-half months' pregnant uterus. This is a point upon which the majority of observers generally agree, for large growths only partially shrink and the period of treatment would extend over too long a period to satisfy either the physician or the patient to justify its use in any but exceptional instances.

Of the 183 cases of this series, 107 presented myomata varying in size between small tumors detected during the

course of diagnostic curettage, to ascertain the cause of bleeding, to the massive growths extending above the umbilicus. There were only a few of the latter group treated, practically all of which presented contraindications to operation.

The ideal type for treatment with radium is the small or moderate-sized interstitial myoma. The primary result is usually prompt, and recession of the growth, while variable, is usually more than one-half; it often entirely disappears or, more frequently, is reduced to a negligible affair. Submucous growths, while responsive to radiation, should be selected with extreme care, owing to their well-known tendency to infection and sloughing after intratuerine manipulations. Pyometra developed in two of the earlier cases of this type, one of which eventually required hysterectomy.

The size of subperitoneal growths is influenced least of all. It has also been noted that radium has very little effect in reducing the size of myomata in women beyond the menopause. Our best results appear to have been obtained in women who gave a history of severe menorrhagia.

Technic of Application. Preliminary curettage should precede the application of radium, in order to eliminate simple polypus and to provide for a microscopic examination of the uterine contents.

The radium, screened by brass and rubber or a celluloid capsule, is inserted to the fundus and left in position from three to twenty-four hours, according to indications.

The average time of exposure in fibroids was twelve hours in young women, and twenty-four hours in women over thirty-eight years of age. As a rule 50 mg. of the radium element was employed. This dosage will produce permanent cessation of menstruation in women over forty years of age in 94 per cent of the cases. In my early work a second exposure was made within ten days or two weeks,

but it was soon found that this was unnecessary and often caused soreness that was persistent and occasionally distressing. At present we believe that one application is sufficient and subsequent exposures are given as indications arise. The recession of the growth may be surprisingly rapid, slow or may appear unaffected for several months, then show marked shrinkage in a few weeks. For these reasons, repeated exposures should be cautiously advised and repeated examinations made to check the status of the tumor.

Latterly, we prefer to make fifteen-hour exposures and repeat the application in three or four months if necessary. As a rule, the single application is sufficient. This permits of its use in younger women, since our experience has shown that, in many, menstruation will reappear after several months or as long as two years and be normal thereafter. Furthermore, the menopausal symptoms are apparently less marked when the shorter exposures are employed.

Of the 107 cases, 102 reported complete relief from hemorrhage within five months after radiation; 2 of the remainder required a second application before being relieved; 2 others were not relieved by a second exposure, and the remaining case did not return. These figures correspond practically with the reports of other observers and prove that no other agent at our disposal equals radium in uncontrollable uterine bleeding.

As has already been mentioned, the effect on the size of the myoma is variable: 57 cases returned within five years for other conditions or for examination; in 37 of these the growth could not be determined at the subsequent examination or was so reduced as to be classed as negligible; in two instances massive growths as large as a seven months' pregnant uterus had shrunk below the umbilicus. They had been bad surgical risks and were radiated to control bleeding. Both were subsequently operated upon successfully. Reports were obtained from the balance of the

series, either directly from the family physician or the patient who reported the findings of their medical attendant, and their records practically tallied with those under my personal observation.

In outlying the limitations of radium too much stress cannot be placed upon eliminating chronic pelvic infection. Latent infection is so prone to be fanned into activity by radiation (in 4 of our cases led to distressing complications) that no case is selected for radium applications when any doubt exists of its presence.

It has been further noted that patients who complained of pain associated with myomata were not usually relieved of the pain even when bleeding was controlled and the tumor partially reduced in size. This symptom is frequently attributed to pressure; but this cannot be always the case, as it would disappear as shrinkage followed. This has happened so often that we usually explain to the patient that the bleeding will cease, the tumor may shrink, but that the pain may or may not disappear.

Of the 183 cases, 76 were instances of myopathic hemorrhage such as are commonly classified as chronic metritis, hyperplasia, fibrosis, uterine insufficiency, etc., a condition most frequent in women approaching the menopause. In this type radium approaches more nearly the ideal specific than any therapeutic agent at our command. Formerly hysterectomy was the only satisfactory available method. At present it can be stated, without exception, that the surgeon who advises hysterectomy in uncomplicated cases of this group, when radium is available, is not acting in the best interests of his patient.

Between the ages of thirty-eight and fifty-four years there were 58 cases. More than one-half had been subjected to all the measures usually employed, except hysterectomy. These received practically the same dosage, viz., a twenty-four-hour exposure from a tube containing 50 mg. of radium element; 3 of these required a second application

within two years for recurrent hemorrhage and were eventually cured.

Between the ages of fifteen and thirty-six years there were 18 cases; 5 between fifteen and eighteen. I desire to call special attention to the five instances of severe hemorrhage in young unmarried women. All had been treated by rest, tonics, glandular extracts and curettage without benefit. The hemorrhage was so severe in 1 case that transfusion was considered. Three to eight-hour exposures with 25 mg. of radium element produced temporary amenorrhea. All were menstruating normally within one year. These are not ideal cases for radiation, but it must be recalled that every other measure had failed to give relief, and the final results were a signal triumph for radiation.

Of 18 cases under thirty-five years, in which it was desirous of controlling bleeding without producing permanent cessation of menstruation, radium was applied for eight to twelve hours until from 200 to 800 mg. hour exposures were given: 6 ceased to menstruate promptly, 3 reported a return in one year; 1 was profuse, the other 2 had a normal flow; 5 continued to menstruate scantily, the flow lasting the normal duration of previous mentruation. In 4 instances menstruation was reduced and remained regular; 3 cases menstruated irregularly and reported scanty menstruation every two or three months.

Three pregnancies were reported in the series. One woman delivered a premature healthy baby at eight months; the second aborted at the fourth month; the third is now six months advanced. An interesting feature of these 3 cases of pregnancy is that in two instances there has been a period of sterility, in one of three years, in the other of eight years prior to treatment.

When it was desirous of controlling bleeding in women over forty years of age, and full dosage was used, immediate cessation resulted in 20 per cent, 60 per cent menstruated only once, 15 per cent menstruated irregularly; the balance

reported no relief and 6 returned for a second treatment. A second treatment was successful in all but 2.

Profuse leucorrhea was noted in about 20 per cent; slight, but persistent discharge in about 30 per cent; in about 40 per cent it was absent or so little as to cause no comment. Not infrequently radium cured or markedly diminished leucorrhea which was present before its application. The leucorrhea, as a rule, rarely lasts over six to eight weeks, but in several instances it was persistent after a year.

A few of the patients were operated upon subsequent to radiation: 4 of these had radium preliminary to operation in order to improve their status as surgical risks; 2 developed pyosalpinx and both required hysterectomy; 2 continued to have pain, even though the bleeding was controlled, and demanded relief; and 2 were discouraged and submitted to operation before sufficient time had elapsed to test the effects of radium.

Subsequent reports as to the symptoms of menopause were interesting. In women over forty, where preservation of function was not considered, about 60 per cent reported flushes and the usual phenomena of the climacterium. In many the symptoms were reported as severe, and almost invariably their history showed that the bleeding had been of the aggravated type. The duration of symptoms lasted about the average of the normal menopause, but in 2 cases the flushes have persisted for six years, and the patients complain that the flushes are as frequent and severe as during the first four months following radiation.

CONSERVATIVE SURGERY IN NONMALIGNANT DISEASES OF THE PELVIC ORGANS

By E. P. Hogan, M.D.
Birmingham, Ala.

In bringing this subject to your attention I do it recognizing that many members of this Association have done pioneer work along this line and have written notable papers on the subject. It is, however, a subject of such great importance—being one on which good surgeons and gynecologists disagree, if not in principle at least on the method of treatment—that it should be discussed not only in the meetings of this Association but in the state and county medical societies until surgeons and gynecologists and general practitioners know and recognize its importance.

In discussing this subject I realize it is a broad one; that papers and text-books have been written on subdivisions of it. It is not my purpose, therefore, to undertake to discuss in detail any subdivision of the subject or in detail any particular disease that may occur in any one of the pelvic organs. In the literature I have read with deep interest and great profit to myself many of the papers and discussions by members of this Association. Extreme positions have been taken. It must be admitted in the discussion of any question that there are two extremes and that there are doubtless good reasons for the extremes. While this is true, good judgment will always dictate the solid foundation or principle on which those who hold to

either extreme may compromise in the interest of the general good—in this case the patient. Ultraradicalism and ultraconservatism may be equally disastrous—the one precipitately, the other slowly but surely.

In the management of any surgical case except in the greatest emergency there should be four distinct steps or points or periods or stages, by whatever name one may designate them. Each one, while an essential part of the whole, is distinct in itself and must have the most thorough consideration by the surgeon. Any one of these steps or subdivisions are of sufficient importance to be the subject of a paper or a text-book. They are:

1. Diagnosis.
2. Preparation.
3. Operation or not, as the disease or the condition of the patient may indicate.
4. Postoperative treatment.

Diagnosis. It must not be assumed in cases referred with a diagnosis of suspected pelvic disease that the illness at that particular time can be attributed to disease of the pelvic organs. Disease of the pelvic organs may sometimes be suspected, with good reason, when on thorough examination no disease can be detected in the pelvic organs. On the other hand, the pelvic organs may be diseased, the pathology being most pronounced, and at the time of the illness causing little trouble, and yet the illness may be attributed to the pelvic organs. The patient may be treated for symptoms which are not referable to the pelvic organs, and these organs may be causing the trouble. In making the diagnosis in any case there should be (1) a complete and accurate history; (2) thorough and complete physical examination; (3) chemical and microscopical examinations of urine; (4) examination of blood, including Wassermann; (5) if indicated, the feces should be examined.

Ordinarily the diagnosis will not be difficult; but if we are to be successful in handling the case a correct diagnosis

must be made in the apparently obscure case if possible. A mortality based on a wrong diagnosis is most deplorable. One may be thoroughly conscientious, and the conscience may be satisfied by saying that the patient would have died anyway, but that does not excuse the mistake. Mistakes made in diagnosis are becoming less frequent, due to the higher standards of the surgeons and to better training and more experience, and also to the notable work which is being done by the American College of Surgeons in standardizing hospitals, requiring the recognized hospitals to have the necessary equipment and facilities to aid in making a diagnosis. Consultations in hospitals and private practice are becoming more frequent. I am thoroughly convinced that where there is the slightest doubt as to the diagnosis, the treatment or the surgery indicated, that the patient should be given the benefit of consultation. Not to diagnose an acute illness with a coincident chronic, acute or subacute pelvic inflammatory disease may lead to disaster. Patients having pelvic diseases or abnormalities may have not only periappendicitis but acute appendicitis with its origin in the mucosa (leading to a gangrenous appendix, ruptured appendix or an appendiceal abscess), general peritonitis of appendiceal origin or other origin, independent of but complicating the pelvic pathology. When the appendix cannot be eliminated absolutely as the cause of the trouble the patient should be kept under the closest observation, and if the suspicion as to the appendiceal origin cannot be removed the patient should be operated on without delay, making a median incision. The pelvic condition may or may not be operated on at the same time, depending on the condition of the patient.

Cases may have an acute illness due to nephritis, pyelitis, or ureteral calculus complicating diseases of the pelvic organs, or the illness may be referred to the pelvic organs as the cause. Patients with tonsillitis, laryngitis, bronchitis, pneumonia, typhoid fever and various other acute illnesses

may frequently have pelvic diseases, and yet the pelvic organs may be regarded as the exclusive cause of the illness. If time permitted, such cases could be discussed in detail.

It is agreed that primary pelvic diseases rarely kill immediately, and that time can be taken for the diagnosis and preparation of the patient for an operation. If the condition of the patient will not permit of this time, such emergency treatment should be given as indicated, observing the principles of surgery as far as possible—the preservation of life being of first importance.

Types of cases referred:

Girl, aged twenty years, menstruating. Sent in for criminal abortion. Examined and diagnosed typhoid.

Girl, aged eighteen years. Sent in for operation for pelvic condition. Examined and diagnosed pneumonia.

Girl, aged eighteen years, four months pregnant. Suspected adnexal disease, with reported negative examination of urine. Examined: Urinary findings incorrect. Diagnosed pregnancy complicated with pyelitis.

Girl, aged twenty-two years. Sent in for acute pelvic disease. Examined and diagnosed general peritonitis due to ruptured appendix.

Woman aged twenty-eight years. Had been treated at home for one week for acute pelvic disease. Examined and diagnosed general peritonitis due to ruptured appendix.

The diagnosis should be made if possible without delay, and in the event a diagnosis is not made consultation should be requested. The means and facilities for the diagnosis are as a rule available.

PREPARATION. By preparation we mean, in this class of cases, not the immediate preliminary preparation for an operation, but that preparation of the patient which will give her the greatest possible chance for regaining her complete health, both as to anatomical structure, function and comfort.

We have eliminated, in the subject of this paper, malignant

diseases. In the discussion of the remaining diseases of the pelvic organs we might properly divide them into, (1) the infectious, (2) the noninfectious.

There are two organisms which are specially prone to attack the pelvic organs. These are the gonococcus and streptococcus. Other organisms may be associated with them or they may attack the pelvic organs independently. A. H. Curtis, from recent investigations of Fallopian tubes in 300 cases of pelvic infection, found "gonococcal infection in 70 or possibly 80 per cent; streptococcal and other pus-producing organisms in 15 per cent. Tuberculous tubes, in the absence of generalized tuberculous peritonitis, were encountered in 5 per cent of the cases."

When the pelvic organs are attacked by an infectious disease the important questions are: (1) What is the predominating organism producing the disease? (2) What will be our method of surgical treatment? A wise decision as to what to do in cases of this character requires not only experience, knowledge and training, but also good judgment and courage. The demand is for immediate operation. By preparation we mean not a fixed decision not to operate, but a decision to give the patient a chance to become the very best surgical risk that is possible, and if by this preoperative treatment—Fowler-Ochsner-Murphy treatment—the patient not only becomes a good surgical risk, but so regains her health or is on the way to such a state of health that the operation may possibly not be required, then she should be permitted to go home, telling her that an operation may subsequently be necessary, but that there is a possibility that she will entirely recover without an operation. She should be kept under observation.

Diseases of the pelvic organs caused by the streptococcus, gonococcus and other pyogenic organisms have their origin usually and primarily in the cervix. The gonococcus invades the endometrium and the tubes. The streptococcus by way of the lymphatics and the blood,

invades not only the endometrium but the parametrium, broad ligaments, tubes and ovaries. The gonococcus usually produces local effects in the pelvic organs, and there is not an invasion of the blood by the organism. The streptococcus not only produces local lesions, but the systemic effect is out of all proportion in its gravity to the apparent local effect produced. The organisms, through the lymphatics and the blood-stream, are carried to different parts of the body, producing not only a deadly effect on the system as a whole, but also metastatic abscesses which may appear in any part of the body. Cases of this character are properly classed as criminal abortions and puerperal sepsis.

What surgical treatment shall be given these patients? This is the question on which there is a wide difference of opinion. There are those who advocate the sharp curet. They are few in number and I think their position is not tenable. There are those who advocate the emptying of the uterus of any retained membrane or placental tissue with a dull instrument, followed by strong antiseptic solutions. There are still others who believe an immediate hysterectomy should be performed. My experience has been that conservative treatment,—Fowler-Ochsner-Murphy treatment—omitting any uterine intervention whatever, has been followed by better results than any operative procedure. We are convinced that the curet is not only harmful but that it is followed by disastrous consequences. By the conservative treatment our results have been gratifying. We have lost some cases, but they were not cases where we believe there was the slightest chance for success by any method of treatment. For the past ten years we have not used the curet in any abortion or puerperal sepsis cases. Hysterectomy with free drainage has been performed with success in a number, but the results by the conservative method of treatment have been far superior to those obtained by immediate hysterectomy.

Criminal Abortions. We have had 109 cases of criminal abortions, most of them being treated conservatively. Of this number we lost the following cases:

Case I.—Mrs. F. S. Admitted to the Hillman Hospital, March 15, 1911, following a criminal abortion, which was acknowledged and for which the abortionist was arrested. Patient was extremely ill. She was taken to the operating room, the uterus being cleared out of placental tissue with a dull curet. Iodine solution, $3\frac{1}{2}$ per cent, was used freely in the uterine cavity. Tape saturated with the same iodine solution was placed in the uterine cavity for drainage. The patient grew steadily worse. A septic pneumonia developed and she died three days following her admission to the hospital.

Case II.—Miss Q., criminal abortion, acknowledged in history. Admitted to hospital two weeks following primary illness. Metastatic abscesses; abscess of the right eyeball; patient in practically moribund condition. Fowler-Ochsner-Murphy treatment instituted. Hypodermoclysis, turpentine stupes to abdomen and supportive treatment, together with morphia or codein for extreme restlessness. Patient died within thirty-six hours after admission. Surgery certainly was not indicated in this case.

Case III.—Miss S., aged eighteen years. Criminal abortion produced in hotel. Remained in hotel one week without attention. She was admitted to the hospital with high temperature, rapid pulse and great abdominal distention. The conservative treatment was instituted but the patient's condition grew rapidly worse and she died within seventy-two hours.

Case IV.—Miss S., young woman aged twenty-eight years, from small town. Came to Birmingham for the

purpose of having an abortion produced. She admitted the criminal abortion; stated that the doctor cleaned her womb out in his office. This patient had high temperature and rapid pulse. She did not complain of any particular pain, but on making a pelvic examination there was pain on pressure in the right and left iliac regions. The ovaries and tubes were not enlarged, the uterus was subinvoluted, being soft and about twice the normal size. Nothing distinct could be made out in the iliac regions except the tenseness of the muscles in the lower quadrants and the pain on pressure. She was treated conservatively. At times she felt perfectly well and did not complain of any pain at any time. Her cheeks were constantly flushed and her temperature never became normal. After three weeks, on bimanual examination, distinct masses were found high up in the right and left iliac regions. These masses were thought to be infiltrations in the broad ligaments. There was no induration posterior to the cervix and no masses or fluctuation in the right, left or posterior fornices. The patient was not improving, although she said she felt fine. I asked Dr. Morris to see her with me and we agreed not to operate. Her temperature was not high. She was suffering no pain, but there was a rapid, weak pulse. I asked the medical service to examine her heart carefully. The medical consultant decided that the patient had a septic endocarditis, following the septic abortion. I saw the patient two hours before her sudden death. At that time she expected to go home within a few days. Her father and mother and other members of the family had come to see her. It is possible that we should have operated on this case. If the broad ligaments had been drained, as suggested in these cases by Dr. Thomas S. Cullen, thus relieving her of the septic focus in the broad ligaments, it is possible that she might have overcome the infection. This operation could have been performed under a local anesthetic.

In all cases of suspected criminal abortion I make it a point myself to get the history as to how the abortion was produced or caused, and whether there is a rise of temperature or not. I do not use any intrauterine treatment in these cases unless there is an uncontrollable hemorrhage. In the latter cases I merely pack the uterus with gauze tapes, which are saturated with 5 per cent to 7 per cent iodine solution, producing only such trauma as is necessary in lightly packing the uterus. Pituitrin, 1 cc obstetrical, is then given, to be followed within twelve hours by another 1 cc of pituitrin. The pack is gently removed within eighteen to twenty-four hours. The Fowler-Ochsner-Murphy treatment is instituted at once. We find that by this method the hemorrhage is controlled and that the patient usually will be free of fever within twenty-four to seventy-two hours and that her improvement steadily progresses. If there is no alarming hemorrhage the treatment is the same, except that the iodized uterine pack is omitted. We have not had a fatal case following this procedure, except as above noted.

Appendicitis Following Criminal Abortion. We have had recently in the Hillman Hospital 2 consecutive cases of acute appendicitis following criminal abortion, 1 within three weeks and the other four weeks.

Case I.—Mrs. B., Hillman Hospital, acknowledged criminal abortion. Extensive parametritis and broad-ligament involvement on admission. Improved rapidly and went home two weeks later. She returned within fourteen days with a diagnosis of acute appendicitis. An operation was performed and the appendix was found to be firmly adhered to the right ovary. The appendix was removed. The left ovary was completely abscessed, being about the size of an orange. As the right ovary was in good condition and as the left ovary was thoroughly abscessed, I decided to remove the abscessed ovary. The

intestines were thoroughly packed off with gauze wrung out of normal salt solution. On removing the ovary it was ruptured. Pus did not come in contact with the intestines. If I could have removed the abscessed ovary without rupturing it I would have closed the abdomen without any drainage at all. As the infection was recent and a virulent one I decided in closing to use a small rubber-tissue drain. The drain was removed in forty-eight hours. The patient had no rise of temperature following the operation and went home in fine condition in fourteen days.

Puerperal Sepsis. We include in puerperal sepsis those cases which give clinical evidence, if not microscopical evidence, of a virulent streptococcal infection following delivery. We have had 26 cases. It is rare that we lose one of this type. The conservative method of treatment seems to be the rational method of treatment. These women are admitted in a greatly exhausted and depleted condition. They have an anxious expression and in many instances look as if they had almost given up the fight. To give them conservative treatment with abundance of fluids, warmth, nourishment, sedatives, elimination by means of enemas and tepid sponges, when indicated, appears to be the rational thing to do. They certainly cannot stand an operation. In most cases the improvement is marked from the beginning. They will frequently ask you if there is a chance. They should be encouraged and assured that you expect them to get well. The treatment of patients with large boggy uteri and with apparently abscessed ovaries and tubes by the Fowler-Ochsner-Murphy method, supplemented by hot turpentine stupes to the abdomen, mildly antiseptic douches and sufficient morphia or codein to produce mental tranquillity and sleep, if persistently carried out by faithful nurses, will cause the apparently moribund to get well. In these cases we outline the treatment, and we let the nurses know that we believe that if the treatment is faithfully and conscientiously carried out the

patient will get well. The method is important, but the faithful nurse or nurses cannot be given too much credit for the recovery.

In the 26 cases of puerperal sepsis, 1 had on admission an appendiceal abscess. The appendiceal abscess was drained and the patient was treated for the puerperal sepsis. The cervix was extensively torn and there was a complete laceration of the perineum and extensive destruction of the left lateral vaginal wall. The uterus was large and boggy. There were large soft masses on either side of the uterus. The patient made a complete recovery. She was permitted to go home and return three months later for the plastic surgery on the cervix, vagina and perineum. This operation has been done recently and the patient is now at home apparently enjoying perfect health. At the time this woman was in the hospital we had a similar case, except the appendiceal abscess.

Mrs. R., aged twenty-four years. She appeared to be moribund on admission. The same treatment was followed in her case as in the last case and she is now apparently perfectly well and holds a responsible position.

We do not, as a rule, find it necessary to do a laparotomy on a criminal abortion and puerperal sepsis cases unless there is a complicating appendicitis or general peritonitis. They are carefully watched and they generally make a satisfactory and apparently complete recovery.

Conservative surgery and radical surgery in criminal abortion and puerperal sepsis cases have a distinct place. We regard vaginal punctures, when indicated, as conservative and life-saving, but if the patient's resistance is such that an abscess wall cannot be formed, or if for any reason general peritonitis has followed and there seems to be definite indication for abdominal drainage or indicated surgery, it is performed. However, I prefer to limit the decision to

operate to those conditions in which there is an acute appendix, an appendiceal abscess, a ruptured appendix or general peritonitis of appendiceal or some other origin. I make no argument in behalf of the appendix, either diseased or not. I think it is a good thing to have it out. The acufe appendix or any sequelæ from the neglected appendix demand an operation without delay. Infections following criminal abortions and in the puerperal sepsis cases are handled best by resorting to laparotomy only when absolutely indicated. These peritonitis cases will usually get well if treated conservatively with no surgery other than a vaginal puncture.

Gonococcal Infection of the Female Pelvic Organs. From an attitude of apparent indifference as to the consequences of the progressive destruction of the female pelvic organs, due to an unknown cause, the profession came by degrees to recognize Noeggerath's findings, in 1872, to be true with reference to the seriousness of the invasion of the then unknown organism which was producing symptoms which were in a degree uniform. Assuming that the organism, which was discovered and identified by Neisser in 1879, as being the cause of the disease which was recognized by Noeggerath, manifested the power then for invading and destroying the pelvic organs and tissues as is characterized by the disease which is now produced by the same organism, we can, in a measure, appreciate the old adage, "Once infected, always infected." To prevent and correct the pathology caused by this organism and to eradicate the infection has been a problem which has confronted, and still confronts, the profession. Various methods have been used in these cases to aid Nature in ridding itself of this organism and to overcome its ravages and dire consequences. There have been those who have advocated medical treatment only, while still others have advocated the most radical surgery. In my judgment, it is agreed that neither extreme subserves the best interest of the

patient. However, each extreme has its right and proper place.

The most thoughtful and the most conscientious surgeons have always desired in doing surgical work to restore the diseased structures or organs to a normal condition if possible; or, if not possible, to secure in all events a good functional result. So in diseases of the pelvic organs it should be our purpose not only to restore the diseased organs to their normal anatomical condition as nearly as possible, but also to preserve the normal function of the organs. This is being done every day by the best gynecologists and surgeons. I desire to do as other members of the Association have done before me, urge upon you its importance and to remind you of the fact that the women that we see who are infected by this organism are appealing to us to be rescued from the ravages of the disease and to be restored to that condition which will make them normal human beings of their kind.

Many members of this Association have had experience with thousands of cases. My paper is based upon my experience with more than one thousand personal cases and an observation of many more. My experience has been sufficient to cause me to realize that we owe a solem duty to every woman whose pelvic organs are diseased. At the height of the disease, in most cases, it is their desire to be immediately relieved of it, if possible, regardless of the method of treatment. It is our problem to know the best method, and a method which will conserve to the patient the greatest good as to structure, function, comfort, happiness, and possible service. After it is all over, and they are apparently well, they will come to see you or write you to know whether or not they are in every sense women. They feel well, and are well, but they desire to become mothers. To be able to answer this question affirmatively gives the greatest satisfaction to the surgeon who operated. Such work done and services rendered by surgeons will

stand as monuments to them, if not in bronze and stone, at least in the hearts and minds of their grateful patients.

Great progress has been made in the methods of handling these cases, but I am sure all agree that there are things which are yet possible in the way of rendering the greatest possible service to women who are suffering from diseases of the pelvic organs The human body exists for a purpose and there should be in case of disease every possible assistance rendered that science knows, to restore it to its normal possibilities. It must not be thought of as merely physical, but those higher attributes and qualities which are dependent upon the normal existence and function of the human body, with its different organs and systems, must be kept constantly in mind. "Do not unto others what you would not have them do unto you," under similar circumstances, should be kept constantly in mind. The gynecologist and surgeon, in dealing with these cases, should never lose sight of the fact that to restore the individual to the nearest possible normal condition is the great object and purpose for which the service is rendered. At this point I take the liberty of quoting Dr. John G. Clark:

"The surgeon who looks upon the human body as a mere machine and ignores the enormous forces encompassed within the sphere of the emotions, the mainspring of happiness, will certainly have to his discredit in the summary of results many cases which date their unhappiness and wretchedness to an unsexing operation. Successful, yes, in actually removing or stamping out the disease, but unsuccessful in that it leaves in its train an unhappy individual, a prey to morbid introspection and dominated by disordered nerves or a pathological psychology. In my experience, it is indeed rare to find a young woman between eighteen and thirty years of age, from whom the ovaries have been removed, who is ever again restored to a normal physical and psychic existence."

This is a great statement by an eminent gynecologist and

surgeon. I would apply the statement to the uterus, ovaries and tubes. The menstrual function should not only be preserved, but every effort should be made to preserve the reproductive function. The fact that a large number of women who have suffered with diseased pelvic organs, and who have been operated on for the cure of the disease, are sterile, is no argument against conservative surgery. The fact that a woman who has had a conservative surgical operation may have to undergo a subsequent operation is no argument against conservative surgery. We do not apply this reasoning to surgery in any other part of the body.

More than twenty years ago some eminent gynecologist had the boldness not to operate on patients suffering with acute pelvic infections. In 1909, Dr. F. F. Simpson, in a paper read before the American Gynecological Society, asked three important questions relative to pelvic inflammation of tubal origin. It appears to me the recognized results of surgeons generally will justify answering two of these questions without discussion. They are:

1. Will operation always be necessary for complete restoration of health, comfort and functional activity?

No.

2. If operation is decided upon, will the coincident occurence of acute illness and operation entail more or less danger than their separate occurrence?

More Danger.

3. If interval operation is decided on, by what means may we determine that a safe time has been reached?

Simpson answers this question as follows:

1. The patient shall have recovered from her acute illness and shall have regained a satisfactory margin of reserve strength.

2. The temperature shall not have risen above normal a single time for a period of three weeks.

3. The inflammatory exudate surrounding the focus of infection shall have been completely absorbed.

4. There shall have been no marked or persistent rise of temperature following a careful bimanual examination.

Our plan is to treat acute pelvic infection conservatively by the Fowler-Ochsner-Murphy method, with such additional treatment as indicated. These cases rarely develop general peritonitis. The infection becomes circumscribed and resolution apparently takes place or a pelvic abscess is formed. After a time, varying from one to three weeks, if the temperature is normal and the patient is getting progressively better, with no evidence of abscess formation, we permit her to go home if she can have proper care and attention. We find it impossible to keep these cases in the hospital longer than absolutely necessary, for two reasons: First, we haven't the bed space in the charity hospital; and second, because of the expense in private hospitals. After a few days the patients usually will be feeling so well that they will go home, even contrary to advice. If there are recurrent attacks the rest treatment is carried out again and an operation is advised after the temperature has been normal for from one to three weeks. As a rule the longer the delay, provided there is satisfactory improvement, the better for the patient.

Pelvic Abscesses. In cases in which pus has accumulated or accumulates in the pelvis as a residue of an infection, it can be drained *per vaginam* under a local anesthetic. In some of these cases vaginal drainage of a collection of pus will be a life-saving procedure. There will be cases in which the abscess is getting larger and larger and the resisting forces of nature are yielding to the infection. This condition should be relieved at once. This condition is not infrequently found in cases that have been ill for several weeks and have just been admitted to the hospital, or that have not before been examined by a competent consultant. They may appear moribund, and yet, by the

simple procedure of vaginal drainage, the tide is turned; and if the vaginal puncture posterior to the cervix has been sufficiently dilated and is kept open by a large iodoform or iodized gauze tape until the abscess is completely drained, which will usually require from seven to ten days, the patient will be relieved of the overwhelming dose of toxin which is constantly being absorbed from the abscess.

Our records show that some cases with large pelvic abscesses return to the hospital with no palpable remains of the former extensive pelvic inflammation. We have one now in the hospital.

CASE.—I was asked by the medical service to examine this patient. On going over her history I found that I had performed a vaginal puncture on her in November, 1920. The pelvic abscess was at that time extensive, involving the entire pelvis, and apparently the right broad ligament was adherent to the abdominal wall. The abscess was thoroughly drained through the vagina. The patient made a satisfactory recovery and was permitted to go home. On examining her this time there appeared to be no disease of the pelvic organs. She is now four months pregnant. These findings were confirmed by the obstetrical service. The diagnosis of the patient's disease, on this admission, is arthritis due to abscessed teeth and infected tonsils. She also has hookworms (uncinariasis).

METASTATIC BROAD LIGAMENT ABSCESS FOLLOWING MEASLES, PNEUMONIA AND EMPYEMA. In this connection I desire to report a broad-ligament metastatic abscess following measles, pneumonia and empyema, which in my experience is unusual.

Miss K. G., aged sixteen years. Diagnosis: Empyema following measles and pneumonia. Empyema drained by rib resection at the McAdory Infirmary; large quantity

of pus evacuated; rubber tubes inserted for drainage. Patient made a rapid convalescence, but on the fifteenth day the patient's temperature became 103°, pulse 120, with extreme pain in the right and left iliac regions. Urine was negative. Leukocyte count, 15,000. It appeared to me that the entire cause of the high temperature and leukocytosis was the same as that producing the pain in the iliac regions. I had my brother, Dr. George A. Hogan, see the case and he concurred with me. Patient was treated symptomatically for three days without improvement. I requested further consultation. The family did not accept the consultant suggested by me and had one of their own selection. The patient not having menstruated since the attack of measles, and as there was a large symmetrical movable mass in the pelvis which corresponded in position and apparent signs to a four or five months' pregnancy, my consultant decided with no hesitation that the patient was pregnant.

I did not agree with him. I had the patient removed to the Davis Infirmary and made a thorough examination under an anesthetic, being prepared to do whatever operation might be indicated. The hymen was unruptured and there was no mass low in the pelvis. The uterus could not be made out separate from the large symmetrical mass which extended into the iliac regions. My decision, then, was that there was a broad ligament abscess which extended across the uterus and was adherent in the midline. I made a suprapubic incision, extending blunt forceps into either iliac region, evacuating an extremely large quantity of pus from both iliac regions. Tube drainage was kept in for seven days. Patient made a rapid recovery and was able to go home in fifteen days.

Acute Pus Tubes. Cases of acute pus tubes are never subjected to an operation for the pus tubes. On 2 such cases I have operated for appendicitis. Pus could be seen

dropping from the fimbriated extremities, but I did not remove the tubes. I closed the incision without drainage and put them on the Fowler-Ochsner-Murphy treatment. They suffered apparently no ill consequences. Before I operated I thought these women had pus tubes, but the consultants urged operation. The operation confirmed the diagnosis of acute pus tubes, and also gave the patients the satisfaction of having the appendix removed.

In operating on young women, ovaries, tubes and uteri are conserved. Ovaries and tubes are resected and not removed *in toto* except under conditions which preclude the possibility of resection. It is unfortunate that there are cases in young women where it appears absolutely impossible to preserve any ovarian tissue whatsoever, and in which it appears that the ovaries, tubes and uteri are hopelessly diseased. If the woman is under thirty years of age—or preferably older, possibly forty or forty-five—a conservative operation if possible should by all means be done. Acute or subacute pelvic inflammatory diseases may be operated on at any stage, with the preservation of the ovaries, tubes and uterus, if adequate drainage is provided.

Old Chronic Inflammatory Diseases. In women thirty and thirty-five years of age and older, where the patient is annoyed by the presence of the diseased structures, or where there are more or less frequent subacute attacks, my judgment is and my practice has been to do such an operation—even though it consists in the removal of ovaries, tubes and uterus—as will serve the best interests of the patient both as to health, comfort, general well-being and usefulness.

In 1909, H. J. Boldt, in a paper read before the American Gynecological Society, reported this remarkable case:

"Mrs. G. M., aged nineteen years, was delivered twelve days before I saw her in consultation. On the ninth day after her confinement her temperature was 104.5°. With

the fever, pain also began in the lower abdomen. On April 28, 1906, her temperature was 105°; the uterus was very large and sensitive. The diagnosis, according to the history card, was septic metritis. May 3: Examination under ether showed that the uterus was surrounded by an exudate, and it seemed inadvisable to make a vaginal section. Leukocytes, 22,000. May 4: Abdominal section. There was present a right ovarian abscess; the right broad ligament and the right side of the uterus were infiltrated. An exsection of the entire right third of the uterine body, which contained an abscess, was done. An abscess of the cellular tissue was opened from above by cutting into the folds of the broad ligament; from this opening the vagina was opened and a drain carried into it and the opening in the broad ligament then closed, the uterine defect having previously been sutured. The pathologist's report was: "Acute suppurative metritis; acute suppurative salpingitis; acute suppurative ovaritis." Recovery was uneventful. From the fourth day on the patient was out of bed nearly all the time, sitting up for the first time on the second day after the operation. During the summer of 1908 this woman reported herself pregnant. She was subsequently delivered by Dr. Brodhead. Both mother and infant left the hospital in good condition."

To my mind, as paradoxical as the statement may seem, this case reported by Dr. Boldt is one in which both radical and conservative surgery were done. Radical in that he operated at all; conservative in that he did not remove the tubes, ovaries and uterus. Surely this case demonstrates the fact that conservative surgery can be performed even in the presence of extensive and virulent infection provided there is adequate and suitable drainage. The fact that Dr. Boldt provided for such drainage in this case is of great importance.

In 1918, Dr. Charles B. Robbins reported 2 cases in which

he performed a resection of the uterus. In 1 the patient was thirty-six years of age. The fundus contained a fibroid together with a fibrosis. She made an uneventful recovery and subsequently became pregnant three times.

Various operators have reported myomectomies followed by pregnancy. With me, it is, when possible, the operation of choice. The following case expresses in a few words the conservatism which I have observed in operating on young women:

Case I.—Miss B., aged twenty-seven, operated on at South Highlands Infirmary, May, 1919. Complaint: Intermenstrual hemorrhage, symmetrical abdominal distention and pain in the left lumbar region. On examination this patient was found to be in good condition in every respect except the large fluctuating abdomen, the long menstural period and the intermenstrual bleeding.

Operation. Median incision extending from the symphysis to umbilicus. On opening the abdomen there was observed a large, dark-colored, left ovarian cyst. The cyst extended across the lower pelvis from right to left iliac regions and extending on the left side to above the crest of the ilium. On attempting to remove the ovarian cyst considerable resistance was encountered. This resistance did not appear to be due to adhesions but to an extension of the growth into the posterior parietal wall in the lumbar region. In undertaking to separate the cyst from the area of anchorage the wall of the cyst was ruptured and the abdominal cavity was filled with a brownish fluid which appeared to be blood serum with hematin crystals in it. Considerable difficulty was encountered in separating the cystic ovary from the point of anchorage. There remained, when it was separated, a rather large area which would remind one of stalagmites of hematin. The pedicle of the ovarian sac was ligated and the cyst removed. I did not know what the mass in the posterior parietal wall was, but one

thing I knew was that it could not, with any degree of safety, be removed. On examining the right ovary, which was about the size of a goose-egg, it was found to contain a fluid of the same character. A large portion of the ovarian stroma had been destroyed. The cystic contents were evacuated. There were only fragments of the former ovary which appeared to offer any possibility of reconstruction. The surfaces were trimmed off and the ovarian tissue was sutured with fine catgut. The tubes were somewhat large. They showed no evidence of infection. On examining the uterus, anterior and posterior, intramural fibroids of fairly good size were palpated. A longitudinal incision was made over each and the fibroids enucleated. Deep-buried catgut sutures were taken to control the hemorrhgae and approximate the tissues in the uterine walls. The serous surfaces were approximated by interrupted catgut sutures. The fluid from the abdomen was removed by large gauze sponges. The abdomen was closed in layers without drainage. Patient had no rise of temperature following the operation and went home in ten days and made a quick, uninterrupted convalescence. Within a short time she was enjoying perfect health, which she does at the present time, two years following the operation. She menstruates, but not regularly.

I had a second case of practically the same type, operated on at St. Vincent's Hospital in November, 1920. Young married woman, aged twenty-eight years, from Huntsville, Alabama, referred to me by Dr. J. D. S. Davis, in his absence from the city.

These women have not been unsexed and they feel in every way as normal women. They have been relieved of the trouble from which they were suffering and they have possible menstrual and reproductive functions preserved.

It is possible that the above 2 cases belong to the same

class of cysts known as perforating hemorrhagic cysts of the ovary, designated by Sampson as "chocolate cysts" in his extensive report of cysts of the ovary.

In reviewing conservative surgery in its relation to our present work, as compared with our work and the work of others ten years ago, we find that conditions have almost reversed themselves. A few years ago practically every case, or at least 90 per cent of the cases, were operated on without delay. Possibly there are some few operators who do this now. Sixty-six per cent of our cases, on being conservatively treated, are permitted to go home after from one to three weeks. They are given instructions as to how to take care of themselves, and in the event that they become sick again they are to be reëxamined or to return to the hospital. At least two-thirds of these do not return for subsequent treatment. My records show for the past few years that at least one-half of the cases which have been turned over to me have not been subjected to an operation at all. Our mortality has been reduced and we believe that the morbidity is in favor of the conservative method of treatment. We get more cases of postoperative adhesions and partial and complete intestinal obstruction following the early and radical operations in acute cases than we do from those conservatively treated.

Not only are the mortality and morbidity records in favor of the conservative method of treatment, but we find that our drainage cases are reduced to a minimum. Drainage, in cases operated on for pelvic diseases, now is less than one-sixth of the cases operated. When the custom was to operate on acute, subacute and chronic cases without delay, drainage was rarely omitted. Anxiety caused from postoperative complications and disturbances is reduced to the exceptional case. Conservative surgery in nonmalignant diseases of the female pelvic organs reduces mortality and morbidity, restores in part normal anatomical structure and conserves the possible menstrual and reproductive functions.

Conclusions. 1. Conservative surgery includes a correct diagnosis, such preoperative treatment—Fowler-Ochsner-Murphy treatment—operative procedure, and postoperative treatment as will save life primarily and will restore the patient to health and a normal or as nearly normal existence as possible.

2. Diseases of the female pelvic organs rarely kill immediately. Coincident acute diseases of other origin not infrequently occur, complicating or overshadowing the pelvic disease. Such cases should be treated primarily for the acute illness.

3. Conservative treatment of acute pelvic infections aid Nature successfully to resist the primary infection. Repeated acute or subacute attacks may require an operation for its relief. Such patients should be again conservatively treated before undergoing the operation.

4. The nonoperative treatment of criminal abortion and puerperal sepsis is followed by a low mortality. In the presence of hemorrhage, which is not controlled, the uterus is gently packed with iodoform or iodized gauze for eighteen to twenty-four hours.

5. Acute pelvic infections with extensive pathology of gonococcal, streptococcal or other pyogenic origin may apparently disappear. Such patients may have complete restoration of function followed by pregnancy.

6. Vaginal drainage has definite indications and is a rational procedure. In some instances life will depend upon the proper use of this simple method of relief from an overwhelming infection. The importance of careful bimanual examination cannot be overestimated. The information obtained thereby frequently accounts for the pains, aches and symptoms which are remote from these organs.

7. Infected ovaries, tubes and uteri may be resected. Possible function is thus preserved. The physical and psychic effect is wholesome. Such cases may and have become pregnant.

8. Postoperative complications are infrequent in cases conservatively treated before operation.

9. Cases requiring drainage are reduced to a minimum.

10. Young women under thirty-five or thirty-six years of age, operated for a nonmalignant disease of the pelvic organs, should have the menstrual and, if possible, the reproductive function preserved. Radical operation—removal of tubes, ovaries and uterus—may be indicated in older women.

11. Conservative surgery of the female pelvic organs reduces mortality and morbidity and increases the possibility of the preservation of these organs and their functions.

Bibliography

Culbertson, Carey: The Management of General Pelvic Peritonitis Surg. Clin. of Chicago, 1920, iv, 675.

Wharton, L. R.: Pelvic Abscess, Arch. Surg., 1921, ii, 246.

Broun, LeRoy: A Review of the Uterine Myomata Operated on at the Woman's Hospital during 1918, Comprising 262 Cases, Am. Jour. Obst., 1919, lxxix, 333.

Peck, G. A.: The Treatment of Abortion Complicated by Sepsis, Am. Jour. Obst. and Gynec., 1921, i, 679.

Cullen, T. S.: The Surgical Methods of Dealing with Pelvic Infections, Surg., Gynec. and Obst., 1917, xxv, 134.

Robins, Chas. R.: Reconstruction of the Uterus, Southern Surg. Trans., 1918, xxi, 292.

Deaver, John B.: Anterior Transperitoneal Hysterotomy, Surg., Gynec. and Obst., 1916, xxii, 424.

Robins, C. R.: The Operative Treatment of Pelvic Inflammation, Southern Surg. Trans., 1919, xxxii, 141.

Montgomery, E. E.: Surgical Treatment of Puerperal Sepsis, Surg., Gynec. and Obst., 1910, xi, 47.

Clark and Norris: Conservative Surgery of the Pelvic Organs in Cases of Pelvic Peritonitis and of Uterine Myomata, Surg., Gynec. and Obst., 1910, xi, 47.

Stone, I. S.: The Conservative Treatment of Salpingitis by Uterine and Tubal Injection, Jour. Am. Med. Assn., 1913, lx, 656.

DuBose, F. G.: The Surgical Treatment of Acute Pelvic Infections in Women, Surg., Gynec. and Obst., 1921, xxxiii, 299.

McRae, Floyd W.: Conservative Surgery of the Pelvic Organs and the Lower Abdominal Wall, Jour. Am. Med. Assn., 1910, lv, 2215.

McMorrow, Frank: Some Old Pelvic Inflammatory Diseases, Jour. Am. Med. Assn., 1913, p. 966.

Coffey, R. C.: Surgical Treatment of Acute Gonorrheal Tube Infections with a Quarantine Pack, Surg., Gynec. and Obst., 1916, xxii, 228.

Vanverts, J.: Treatment of Complicated Abortion, Rev. Française de gynéc. et d'obst., Paris, 1920, No. 9, xv, 361.

Stix, R.: Treatment of Febrile Abortion, Monatsschr. f. Geburtsh. u. Gynäk., Berlin, 1920, No. 6, lii, 394.

Douay, E.: Treatment of Infected Abortion, Gynéc. et Obst., Paris, 1920, No. 6, ii, 428.

Curtis, Arthur H.: Bacteriology and Pathology of Fallopian Tubes Removed at Operation, Surg., Gynec. and Obst., 1921, xxxiii, 621.

Hermstein, A.: Turpentine Treatment in Puerperal Sepsis, Zentralbl. f. Gynäk., Leipzig, 1921, No. 19, xlv, 683.

Potvin: Hysterectomy in Acute Puerperal Infection, Gynéc. et Obst., Paris, 1921, No. 3, iv, 207.

Watkins, Thos. J.: Pelvic Infections in Women, Jour. Am. Med. Assn., 1916, lxvii, 1076.

Rongy and Arluck: Missed Abortion, Surg., Gynec. and Obst., 1921, xxxii, 171.

Clark and Norris: Treatment of Pelvic Inflammatory Lesions by Surgical Means, Surg., Gynec. and Obst., 1917, xxv, 33.

Sampson, J. A.: Perforating Hemorrhagic (Chocolate) Cysts of the Ovary, Arch. Surg., 1921, iii, 245.

Clark, John G.: The Diagnosis and Treatment of Pelvic Inflammatory Lesions, Surg., Diag. and Treat., 1921, iii, 489.

Boldt, Hermann J.: Conservatism in Surgery of the Pelvic Organs, Gynec. Trans., 1909, xxxiv, 327.

Simpson, F. F.: Choice of Time for Operation for Pelvic Inflammation of Tubal Origin, Gynec. Trans., 1909, xxxiv, 161.

Hofmeier: The Later Results of Ovariotomy, Especially in Cases of Doubtful Character of the Disease, Gynec. Trans., 1909, xxxiv, 332.

McRae, Floyd W.: Conservative Pelvic Surgery, Southern Surg. Trans., 1916, xxviii, 345.

DISCUSSION ON THE PAPERS OF DRS. C. JEFF MILLER AND E. P. HOGAN

Dr. Howard A. Kelly, Baltimore, Md.—It has been a pleasure to hear this excellent paper by Dr. Miller. My memory harks back to the first paper I prepared for the American Gynecological Society, some twelve years ago, at which time I was begged not to press radium on the Association, as

it had such mysterious qualities and such remarkable claims were made for it that it seemed little better than some kind of quackery. Consequently, I withdrew my paper.

I have been using radium now for thirteen years. I can reaffirm what Dr. Miller has stated so well and so convincingly in this paper.

In the treatment of fibroid tumors of the uterus, after an experience of 2000 operations, I now place radium first and surgery as a secondary consideration. Radium takes precedence in all uncomplicated cases. But where there is an element of serious doubt as to the diagnosis, or where there are serious pressure symptoms and the pelvis crowded, or where there is reason to expect a complicative inflammatory condition or an ovarian tumor we resort at once to operation. However, even here radium may be best in the pressure group. Just a few days ago a patient came in to see me who had had serious bladder symptoms but refused operation. I used radium against my will, but she came back relieved and the tumor much reduced in size. We should make in every case a thorough examination of the curettings under anesthesia, and I would emphasize above all in the bleeding cases a search for polypi. Small polypi of the mucosa may cause all the hemorrhagic symptoms, relievable by a simple curettage or the use of the polyp forceps.

What then are we to expect in these fibroid tumor cases from the application of radium?

1. The cessation of menstruation in nearly all cases, with the injunction that there may be at least one free period.

2. We get a notable reduction in the size of the tumor.

3. Or a complete disappearance of the tumor. I have seen several of this third class recently—large tumors reduced to an insignificant size or practically gone under radiation.

As to the dangers if the radium is left for a long time in one place in the uterus it is apt to produce a local slough of the endometrium and a prolonged leucorrheal discharge. This may produce pains throughout the body or localized rheumatic pains; it is important to avoid a long application at one spot. We sometimes supplement the intrauterine applications, having grams of radium at our disposal, by external applications distributed over a wide area and over the ovarian regions.

We do not feel that there is any limitation to the use of radium in the size of the tumor. Tumors well above the umbilicus

have been reduced to an insignificant size as well as those that are smaller. I show one of these treated in this way wholly externally which disappeared.

Regarding the option between radium and surgery, myomectomy comes into play oftener than it did. I operated on such a case the day before leaving home, taking out twelve fibroid tumors. (February 16, the patient has recovered and has a perfectly normal, mobile, small uterus.)

As to the bleeding (myopathic) uteri, radium is as near a specific as anything we have, but we must be careful to exclude any obvious gross pathologic lesions which may account for the hemorrhage, resorting to a bimanual examination under anesthesia and curettage in all cases.

I often curette on my examining table in my office, using a small curette with a minimal dilatation of the cervix and securing easily enough tissue for immediate microscopic examination. Then I go ahead later and administer radium. To do this safely one must exercise careful discrimination. As I have said, radium is a specific in the bleeding uteri of women forty years of age and older. In the younger women I would urge a curettage under gas anesthesia, and, if necessary, repeated curettages at successive periods. They do harm. If a young patient is exsanguinated one may use radium in a dose of about one-fourth or one-fifth the amount which would ordinarily stop menstruation. The period comes back even if it disappears for a year or two, or it may continue lessened as one desires. We have had cases in which pregnancy has occurred afterward.

Dr. Robert S. Hill, Montgomery, Ala.—In connection with the discussion by Dr. Miller of the use of radium for the cure of uterine hemorrhage where there are no growths or other pathologic conditions observable I wish to bring to your attention the use of formalin. For about six years I have used formalin in these cases with very gratifying results.

About 1 dram of formalin, full strength, is injected into the uterine cavity. When the instrument is withdrawn from the uterus the escaping fluid should be thoroughly wiped from the vagina to prevent irritation. I prefer not using a tampon, as this is liable to absorb some of the escaping formalin, and by holding it against the cervix cause undesirable irritation. However, in some cases of profuse bleeding it is necessary to use the tampon.

There is also danger in these cases of the formalin being washed away by the flowing blood before it has its effect. To prevent this I often allow the instrument through which the formalin has been injected to remain in position, acting as a plug, for a minute or more. It is then gently removed and if the bleeding continues freely I do not hesitate to reinsert the instrument and give another injection. In other words to get results you must see to it that the formalin remains in the uterus long enough to have an effect. It seems to have a dehydrating effect, as there is a watery flow for several days after its use. In the severe cases curettement is desirable before using the formalin.

The injection does not produce much or prolonged pain. I have never had to give an opiate. As a rule, after a few minutes the women will get up and go their way. Occasionally one will wish to remain in the recumbent position one-half or three-quarters of an hour and 5 grains of aspirin or 1 dram of aromatic spirits of ammonia should be given.

I have never had pelvic inflammation to follow the treatment. Two or three treatments will cure the average case. In formalin we have an agent easily obtained and simple in its application with no possible effect on the function of the ovaries.

With reference to Dr. Hogan's paper, I cannot bring myself to the view that good surgery requires us to exercise the degree of passivity indicated. It seems to me, sound surgical principle impels us to see that the uterus is empty in every case of criminal abortion or any other abortion, and to my mind an infection does not change the indication. Furthermore, if there is any obstruction in the cervix to an easy flow from the uterus I do not hesitate to insert a rubber drainage tube to ensure against a purulent accumulation in the uterus.

Dr. F. G. Dubose, Selma, Ala.—I think Dr. Hogan's record is unusual. His operative record is particularly creditable, as his statistics were approximately much lower than the average percentage of those who are doing this work or who are reporting the same class of cases following the method he has adopted.

There are certain refinements of surgical judgment in connection with these cases and those refinements are born very largely of experience. After one has tried different methods

for many years, as a result of his failures and surprises he will very materially modify his treatment in each individual case.

It seems to me there are primarily three things to be considered: (1) The saving of life; (2) the restoration of health; (3) the conservation of reproduction. The opposition to immediate surgery in pelvic peritonitis within twenty-four to forty-eight hours is based largely upon the report of a frightful mortality, but it has been clearly proven by the cases reported by the different members of this Association that the mortality in these acute cases is less than 1 per cent. We believe that more than 1 per cent of fatality should be put in the balance against 5 per cent. We do not believe any woman should be allowed to die of acute peritonitis in order that five in the same group may become pregnant. That may be biologically a wrong contention.

Then another factor comes in which has been impressed upon me time and again, namely, there is difficulty in making a differential diagnosis in a disseminated pelvic inflammation, particularly in those cases of sudden onset which present a picture of an acute surgical pelvis. Many of us have gone into these cases expecting to find a diseased appendix and found a ruptured ovarian abscess or a pus tube instead. We have operated on these cases and they have promptly recovered. Again we have gone in expecting to find a pelvic mass or pus tubes and instead the operation revealed an acute appendicitis or a ruptured appendix. A thing that changed in a large measure my plan of attacking any of these cases when admitted to the hospital after twenty-four to forty-eight hours' observation, provided they were growing progressively worse, is that on pelvic examination finding a pelvic mass and feeling this acute pelvic inflammatory condition would subside by waiting twenty-four to forty-eight hours I have found a ruptured appendix with a disseminated general peritonitis, with pus everywhere, and these patients have died. From the cases reported here today it seems to me any operation in any stage if properly done is safe. When one takes a series of 600 cases reported, with 4 deaths, operated on in the acute inflammatory stage, less than 1 per cent of deaths, the time has come when we ought not to be antagonistic to immediate operation. There is but one contention that all of us recognize, namely, the pelvic basin is more tolerant than any other part of the abdominal cavity, and because of that toleration

these patients, if they are allowed to rest and cool off, will go to another surgeon to be cured. That has been my experience.

We see occasionally a few cases that have undergone vaginal section for pelvic abscess. I have known personally in my own community of more than one death in the hands of men who were very competent. I recently saw a woman who came in with a postpuerperal infection which she had in a hospital in a neighboring city. She had had a pelvic abscess drained. She came to me nine months after with symptoms of coxitis and also with a vaginoureteral fistula. If she had had adequate surgery the danger would not have been greater and she might have avoided being bedridden for nine months and her case practically hopeless. Preoperative observation in these cases is most important. Next is the character of the operation done and the adequate drainage resorted to. If we are able to obtain a mortality of less than 1 per cent by another method than we have heretofore resorted to that method ought to be investigated.

Dr. Hermann J. Boldt, New York City.—I have been particularly interested in the painstaking observations that have been reported by Dr. Miller and I wish to express my appreciation to him for imparting to us his experience. I have had opportunity to observe a fairly large number of patients upon whom I did rather complicated multiple myomectomies, and perhaps from one-quarter to one-third of those women have borne children, which is very satisfactory when one considers the patients. I am not speaking of an ordinary simple myomectomy where a women may have one or two interstitial myomata, but of the more complicated cases such as Dr. Kelly referred to, where we have partly interstitial and partly submucous myomata, where we have complicated conditions. If we can save these women their pelvic organs and see them bear children subsequently it is a very decided satisfaction.

The next point with regard to that class of cases is: It has been formerly our experience that these women during pregnancy and during delivery ran considerable risk in having rupture of the uterus. It has been my custom to send these women to one of the lying-in hospitals, but so far none of that particular class of patients has been subjected to Cesarean section. They have been delivered with forceps.

One more point which was referred to by Dr. Kelly and that is the class of women he spoke of curetting frequently. Dr. Hill spoke of using formalin. I can only again revert to a statement I have previously made that I have had a large number of satisfactory results in these cases from the use of chloride of zinc.

In regard to the address concerning pelvic infections I do not believe it is as simple as the doctor mentioned to operate upon these patients with acute plevic infection, except in exceptional instances, unless we can reach the focus of infection through the vagina. In the class of cases in which we can reach the focus of infection through the vagina it should be done, and, as a rule, gynecologic surgeons at least endeavor to avoid all radical operations, but proceed conservatively in the great majority of instances where formerly they operated radically.

Dr. Guy Leroy Hunner, Baltimore, Md.—I think this session might be called our conservation meeting. On the first day we had a splendid paper by Dr. Baer in which the conclusion seemed to be that in these tremendous operations on the spine the best plan was to go slowly, and Dr. Ochsner, in his excellent discussion of this paper said he felt it was better not to operate on these patients. Yesterday we had an unusual symposium on the gastrointestinal tract, and the general consensus of opinion seemed to be that patients should be more carefully chosen for surgery, and that if surgery was necessary the simplest possible operation that would promise results was the preferable one to do. Today we have had this symposium in a field which does not present such tremendous surgical problems as the other two fields, but because of the great frequency of the pathologic conditions concerned the sum total of morbidity and disability is perhaps equal to those of the other fields.

I asked Dr. Burnam to have his secretary look up the cases I had sent him of these unusual uterine bleedings and of fibroids in the past five or six years, so that we might get a summary for discussion of Dr. Miller's paper. He found that I had referred 33 cases in all, 24 fibroid cases, and 9 of these bleeding cases; the younger women with the hypertrophies and ulcers of the endometrium and the myopathic cases near the menstrual period. I am sure the fundamental results in both these classes

of cases are satisfactory to the men who refer the patients and satisfactory also to the patients themselves. The fibroid cases, of course, must be carefully selected. We must be sure they are fibroids and not ovarian cysts. In one case which I diagnosed fibroid tumor of the uterus and referred to Dr. Kelly, who confirmed the diagnosis, radium was used, and later the patient had a ruptured, infected ovarian cyst with general peritonitis, from which she died. I feel with Dr. Miller that we are not giving the patient a fair or square deal if we find uncomplicated fibroids of this small variety if we go ahead and operate on them when radium is available. I believe they are essentially radium cases.

Dr. Charles R. Robins, Richmond, Va.—When radium was first spoken of by Dr. Kelly I understood—I do not know whether it was true or not—he had $350,000 worth of radium. So I concluded that so far as radium was concerned it was not for me to use, and I sent all these cases to Dr. Kelly. I have not had a great deal of experience with the use of radium, but recently, of course, it has gotten down to a price where the ordinary doctor can use it.

I wish to say a word, first, about bleeding and fibroids, particularly occurring in young women, and to call attention to an operation described in a paper read by me before this Association on "Resection of the Uterus." The point about resection of the uterus lies in the fact that there is a large part of the uterus that presents itself for resection. The blood supply coming in from the sides and the tubes coming in from the sides make it possible to remove a large section of the uterus and sew the lateral aspects together and have a very good uterus when you get through. You do not interfere with the blood supply and it is possible to preserve a cavity in the uterus. At the time I read this paper I reported 1 case that had become pregnant. She became pregnant three times but aborted twice. The third time she had a fine baby. Since then I have had another case, reported recently, of an unmarried woman on whom I operated. She got married and became pregnant promptly. I do not know what the final outcome of that case is. But the point I want to make is this: In cases in which we can use this operation of resection of the uterus it is superior to hysterectomy, and it is superior to radium, because in resection menstruation not only is pre-

served but also the possibility of pregnancy. Those cases I have operated on where they have had an opportinuty have become pregnant promptly.

Just a word about conservative work on the tubes. I have found that the best conservatism, so far as the tubes are concerned, was to give them every chance to get well by themselves and without operation. I must confess that when it comes down to operating on the tubes I have had poor success. I have heard papers in this Association where it was said that all you had to do was to run a probe down the tube and put in carbolic acid and it would be just as good as ever. I did that in 3 cases and had trouble. The only successes I have had in treating inflamed tubes, so far as subsequent impregnation is concerned, were in cases in which I had not attempted to do any conservative work at all. I cut the tube off, ligated and removed it. I had 1 case of gonorrheal infection in which I started out to operate for pus tubes and ran into an abscess and drained. This woman became pregnant and aborted. Following abortion the tubes became inflamed again. I removed the tubes entirely as I thought, and after that she became pregnant and got a living child. My experience has been that where you leave the fimbriated extremity of the tube it will adhere and give trouble. On the other hand if you cut it off short there is some chance of its opening up.

Dr. Miller (closing the discussion on his paper).—I have nothing further to add in closing the discussion except to thank Dr. Kelly for his brief but illuminating discussion of radium in the treatment of myoma and essential hemorrhage.

As my experience has increased I have become more convinced that we have been too radical in the treatment of fibroids and we are now in possession of sufficient data to prove this contention. We made errors in the management of these cases in early years of our work, but I think we now know definitely the limitations of radium and can determine fairly accurately the cases that can be successfully treated without operation. I believe it will eventually be shown that nearly 50 per cent of the cases of myoma of the uterus can be better treated with radium than with surgery.

Dr. Hogan (closing the discussion).—With reference to the remarks of Dr. Hill, who has taken the position that we

should empty the uterus, that it is the first thing to do in certain cases. If there is any indication to empty the uterus it ought to be done, but I find that if one gives these patients a little time and then a little pituitrin the uterus will empty itself. See them any time they report to you, put them to bed, give them pituitrin that night and the next morning the uterus will usually have expelled its contents. If there is persistent hemorrhage and there is indication for emptying the uterus and surgical technic is observed and no curetting done, if one uses iodine in the uterus in these cases he can get by with it without trouble.

As to conservative and radical surgery in these cases, I think the men who have these two views in mind agree in purpose and they differ only in detail. We are getting more nearly together, and if this subject is brought up from time to time before this Association I think there will be an agreement. This discussion is helpful.

This Association is known as the Southern Surgical Association. In the beginning it was the Southern Surgical and Gynecological Association, and when I was a little boy it was my ambition to be a member of this organization. I venture to say that more than 50 per cent of the surgery done by the members of this Association is gynecic surgery, and I may say further that one will hardly get back home before he will be confronted with a serious problem in this field, and he will undoubtedly deal with it in such a way as to conserve life and conserve the woman's well-being. We are getting nearer and nearer together and this subject ought to be brought up at every meeting. I have obtained a great deal of information from a review of the literature on this subject in connection with my own cases.

TRAUMATIC INTRACRANIAL HEMORRHAGE: REPORT OF TEN OPERATIVE CASES

By William Perrin Nicolson, M.D.
Atlanta, Ga.

Traumatic intracranial hemorrhage is perhaps more frequently overlooked and untreated than any lesion in the brain. At least its manifestations are more frequently attributed to some other pathologic condition. Perhaps we might say that true concussion of the brain is stretched to cover fatal conditions that may be remedied by surgical interference. The profession does not realize that exploratory operations on the brain are as feasible and as free from danger as in other parts of the body. Invasion of the cranial cavity for purpose of exploration is usually harmless and free from risk.

In a somewhat long experience quite a number of cases of intracranial hemorrhage have come under my care, and in many instances such brilliant results have been obtained that I feel that some good may come from calling attention to them. The premise may be laid down that in any case of injury to the head where there is temporary unconsciousness that passes away and subsequently returns, there is a hemorrhage with perhaps slow accumulation, and steady increase finally causes death if not relieved, or, if not fatal, subsequently results in a cyst that permanently damages the brain and destroys the usefulness of the victim. These are the cases that are so frequently pronounced con-

cussion, losing sight of the fact that concussion is of necessity a transient and temporary state that does not return after consciousness has been restored. Another fact that we see nowhere mentioned is that there may supervene a paralysis many weeks or even months afterward, strange as it may seem, where sometimes immense collections of blood may be found. The following cases will serve to illustrate this in a practical manner:

Case I.—J. M. H., aged fifty-two years, carpenter, fell from a scaffold, striking upon his head. He was apparently not much hurt and after a short time resumed his work. Ten days later while carrying a bucket of water in his right hand it dropped suddenly and his right arm was paralyzed. He was taken to a hospital, placed in the medical service, and in a few days his entire right side became completely paralyzed together with the complete loss of the power of speech. I saw him upon my return to the city and he was taking 5 gr. of iodide of potassium three times daily.

The same afternoon he was taken to the operating room and a large opening made in his skull over the motor area of the brain. The color of the dura was very dark and a small puncture allowed a clot to ooze out under great pressure. Through a large incision into the dura an enormous blood clot, representing fully a pint of blood, was removed. The brain was shown to be pushed away from the skull fully two inches, causing the entire right side of the skull to be practically empty. The brain surface was perfectly flat and the fissures were only the lines of the surface. A celluloid plate was inserted and the scalp wound closed with a fine chromic catgut suture. The next morning motion in the foot was apparent and in a few days motion was restored to all the muscles, speech being the last function to return. The celluloid plate after ten years is in perfect shape and causes no irritation or trouble in any way.

Case II.—Miss J. H. fell from a stepladder in February 1918, injuring her back and striking her head in the fall. All efforts in taking care of her were expended upon the back, as there is no contusion of the scalp. One month afterward I saw her in consultation on account of her growing stupid and having difficulty in speaking. When I saw her she was stupid, talked with much difficulty and her right hand was distinctly weaker than the left. I was told that these symptoms had become manifest in the last few days. While observing her for several days she became totally unconscious, the bowels and bladder moving involuntarily in the bed. Operation was immediately decided upon, and a large opening exposing the motor areas of the left side showed a blood clot covering the whole side of the brain. This was removed with a blunt curette, the finger, and with artery forceps wrapped with gauze. The clotted blood was very dark in color. Recovery was uneventful, and the patient has remained perfectly well for now almost four years. A plate cannot be recognized by palpation of the skull.

Case III.—J. H. W., aged twenty-three years, machinist, while at work was struck on the head by a sledgehammer that flew out of the hands of a fellow-workman. He fell unconscious, but recovered in a short time and resumed his work. Three months afterward, while working at the same machine, he fell unconscious and was taken to a hospital, where he was treated for two weeks. The entire right side was paralyzed and he could not speak. Several months later he was sent to me on account of continued right paralysis and difficulty in speaking, as he was almost unable to make himself understood. A few days later I opened his skull over the motor area on the left side. As soon as the brain was exposed it was pushed out on account of the intense intracranial pressure, so much so that its structures were injured by the cut edges of the bone. The

brain had to be held by gauze pressure until the opening could be enlarged in order to prevent serious laceration. We were disappointed to find no sign of the hemorrhage, but in passing the finger downward under the temporosphenoidal lobe there was a gush of blood as if some large vessel had been torn, and the brain immediately fell back into the skull. Examination of the blood on a sponge showed it dark brown in color and hence old blood in liquid state. By lifting the brain upward it would demonstrate a circle about two inches in diameter where the effusion had been encysted under the lobe. A celluloid plate was inserted and the scalp closed with a continuous suture of No. 000 catgut. Recovery of this patient was a little slow on account of the long pressure that had existed, but in a few months all of the paralysis cleared up and speech was restored perfectly. He has remained perfectly well for two years.

Case IV.—Mary S., aged ten years, was thrown from a horse at 11 A.M., falling upon her head. She did not appear to be much hurt and required no special treatment. The next morning, just twenty-four hours afterward, she was playing in the yard, when her mother saw her spin around and fall. Her physician brought her straight to the hospital, and when seen in the afternoon she was found to be stupid, lying with her eyes closed, but could be aroused by loudly calling her. There was a contusion upon the left side of the head and the left pupil was widely dilated. She was taken immediately to the operating room, and when the skull was opened a blood clot pushed up through the trephine opening. When this opening was enlarged a large blood clot was found extending from the frontal bone back to the occipital. This was curetted out, and a pinhole opening in the middle meningeal artery was located, which was leaking perhaps a drop to the second. The artery was ligated and the wound dressed as in the other cases. The

next day found her conscious and free from any disturbance, and she left the hospital one week afterward. The plate in this case, on some account, became infected and was removed six weeks afterwards. The patient has remained perfectly well.

Case V.—J. W. C., farmer, aged forty-five years, fell from a ladder in August, striking upon his head. The next morning he found that he had double vision and that his right eye had an internal squint. He was brought to Atlanta to Dr. F. P. Calhoun, who prescribed potassium iodide for him. In January following he was brought to me with supposed symptoms of brain tumor, and was referred for examination to Dr. L. M. Gaines, neurologist. While he was being watched and was awaiting diagnosis, he was found, when I called to see him a few days later, profoundly unconscious with involuntary movements of bowels and bladder. It was not possible to decide whether he had any general paralysis or not. But on account of the right-sided squint, believing it to be due to a paralysis of the sixth nerve, we opened the right side of his skull. When the dura was opened there was a large accumulation of dark fluid in the anterior and lateral portion of the skull, rendering the right side empty. The dura was closed without drainage and a plate applied in the usual manner. He became conscious the next morning and the squint gradually disappeared, the double image in the eye growing closer developed each day. After two years he is now perfectly restored and remains in good health.

Case VI—E. E., aged ten years, fell from a tree in the afternoon, striking the side of his head on a picket fence. He was unconscious for a short time, but this passed away soon afterwards. Later his physician noticed that he had become stupid and took the midnight train, bringing him to me. In the morning, soon after his arrival, he was lying

with closed eyes, apparently asleep, but upon being called loudly he would open his eyes. There was no paralysis on either side. There was a contusion of the scalp where the head was struck, but we could not detect any fracture nor was there any ecchymosis. He was taken to the operating room at once, and when the scalp was reflected there was found an extensive linear fracture of the parietal and temporal bone without displacement. When the skull was opened there was found a very extensive blood clot covering the whole side of the brain, and when this was removed there was found a leaking injury of the middle meningeal artery. This was ligated and the scalp closed in the usual manner. The patient cleared up at once and his recovery was uneventful.

Case VII.—Mr. W. J. W., lawyer, aged sixty years, of Ocillia, Ga., seen with Dr. Dismuke, was found two weeks before lying by his automobile in the road. He did not become unconscious and had been in the hospital since injured. He was lying apparently asleep, but when spoken to loudly would open his eyes, and would press my hand when requested to do so to test his muscular strength. The nurse had noted that ever since injury he had used his right hand much less than his left. There had been involuntary movements of his bowels and bladder since his entry to the hospital. He had been seen by two surgical consultants, who advised the usual prescription of potassium iodide. Operation was done in Ocillia, Ga., one hour after arrival there. When the skull was opened there was found a great clot spreading over the frontal and temporal region of the brain, which when opened showed an enormous collection of bloody fluid that occupied the whole front and right side of his skull, compressing the brain until its surface was perfectly flat and free from any signs of convolutions. He made an uneventful recovery and became well enough to resume his work, but six months later died suddenly from cerebral hemorrhage.

Case VIII.—P. J., aged fifty-five years, farmer, was struck upon the side of his head by the governor of a steam-engine seven years before. He was unconscious for a short while but recovered his consciousness. The next day he became completely paralyzed upon the right side and was never able to speak a word. When he came under my charge he walked with much difficulty with a cane and crutch and was still unable to speak at all. He had been treated with electricity in both extremities for all these years with no suggestion of surgical interference. Operation was performed on the left side of the skull, where there was found an enormous collection of fluid, which was enclosed in a great blood clot. Though this trouble had existed for seven years the patient was so much improved that in a short time he gave up his crutches, but very little improvement in speech had taken place at the last report. This patient was much delighted with the benefit he received, but evidently an early operation would have resulted in a complete cure.

Case IX.—J. H. N., while engaged in a game of billiards, was struck upon the side of the head by a billiard cue, causing a small scalp wound over the left parietal eminence. In going home he passed by the hospital and had his wound dressed. When he reached home he was much surprised to find that his family could not understand anything he said. He was sent to the hospital and came under my observation the following morning. There was no paralysis and no disturbance of brain function except that though making diligent effort he could not form an intelligible word. A diagnosis was made of a hemorrhage over the speech center, which was fully two inches below the point where he was struck. Operation showed no fracture, but a leaking meningeal artery was found with a clot over the fissure of Sylvius. The meningeal artery was ligated, and the wound was closed after an insertion of a celluloid

plate. He was able to talk next morning and remained in good condition up to the last time I received a message from him.

Case X.—In an altercation a man was stabbed with a pocket-knife over the left side of the forehead, the knife breaking off and remaining in the skull. That night he became profoundly unconscious in the police station and was brought into the hospital the next day. He was operated on at once, and upon removing the skull a punctured wound of the dura about one-half inch long was found. An attempt was made to irrigate the track of the knife, and while doing so the return flow stopped and the blood clot began to emerge through the dural split. This gradually increased until a clot the size and shape of a hen-egg was delivered entire. The next day found this patient conscious and talking without difficulty, but on the third day he showed signs of brain infection and died on the fifth day. Autopsy showed a suppurative infection through the ventricles of the brain down as far as the fourth. This is another case where a more prompt operation would have saved life.

These reports show that a majority of cases reveal a subdural hemorrhage, and in each there is found at the time of operation no actual bleeding, all having ceased spontaneously. It is also interesting to note that, in a number of instances, weeks and even months elapse before any symptoms of hemorrhage develop. In all cases caused by extradural bleeding the middle meningeal artery was still bleeding and required ligation. Also we note that extradural hemorrhage was always slow and continuous, with deepening coma that was also constant. Hence the important lesson we desire to impress is that a person receiving a head injury and recovering from a temporary concussion, who passes into a renewed unconsciousness with loss of brain function,

is suffering from hemorrhage or brain edema and becomes a surgical case. Exploratory operation will usually locate this spot without trouble, but in some cases it may be too deep to be removed. Two such cases have come under my charge, and in one of these the decompression gave a good result, the patient recovering consciousness and finally left with a partial paralysis. If this is done the deaths from concussion of the brain will be materially reduced, and one who permits such a patient to die without resort to surgery will place upon the profession a serious responsibility.

Technic for Operations for Hemorrhage. Many devices have been employed for controlling hemorrhage upon the scalp, which often amounts to a considerable loss of blood. A very simple and effective method is one designed in my work which I have never seen suggested elsewhere. The temporal artery is located with the left index-finger where it crosses the zygoma and a sharply curved needle armed with a ligature of No. 00 chromic catgut is passed behind the artery and brought out as near to it as possible. The ligature is tied over the skin and the hemorrhage is cut off in a few seconds. Should a much more complete control of the bleeding be desired this can be repeated upon the other side also.

Bleeding from the scalp, on account of the thickness of the skin, is not easily controlled by ordinary artery forceps without damaging the suture line. A forceps designed by me and shown in the (Fig. 2) locks within an interval of one-eighth of an inch and is made so that it catches behind the suture line. Extent of control of the jaws amounts to about three inches, so that two would control the detached flap.

The choice of opening the skull lies between the osteoplastic bone flap and the rongeur. The latter I prefer, so that the bone opening may be confined to just what is

FIG. 1.—Patient wearing plate in left side of forehead covering large opening for brain cyst.

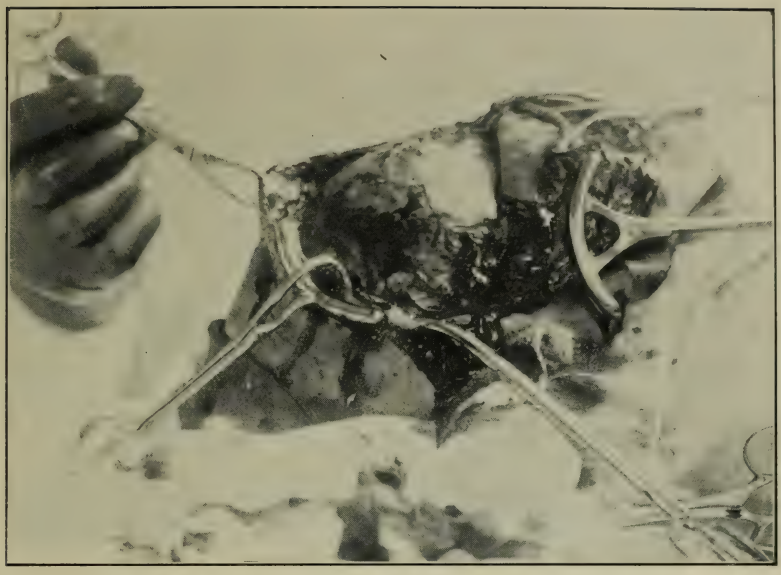


Fig. 2.—Author's scalp forceps for controlling wide areas of the scalp. Left center shows backward catching forceps under attached portion of scalp.

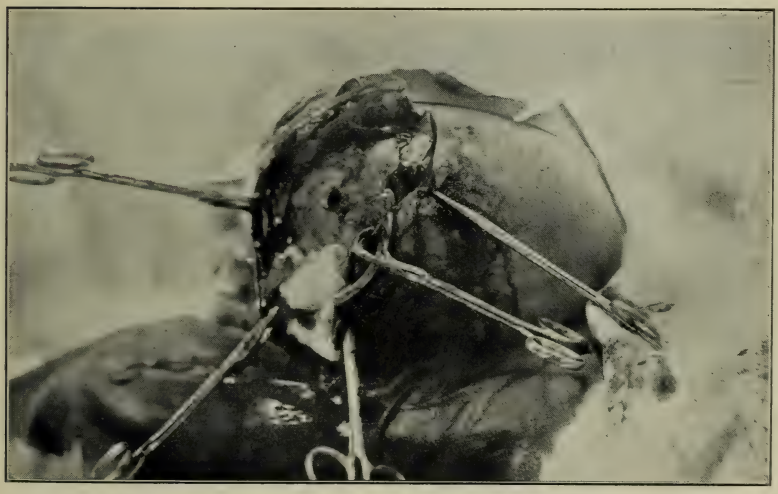


Fig. 3.—First trephine opening.

Fig. 4.—Opening enlarged by rongeur.

Fig. 5.—Wound of scalp closed with 000 chromic catgut sutures continuous.

FIG. 6.—Plate nailed to skull with three-ounce carpet tack.

FIG. 7.—Gauze drain brought through plate and scalp.

FIG. 8.—Lacerated and contused brain where the dura had been entirely removed and plate was placed in direct contact with brain substance.

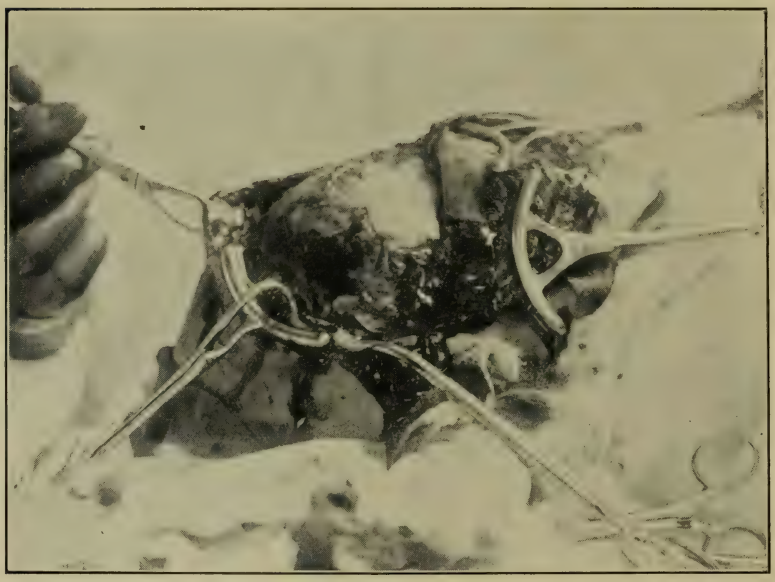


FIG. 9.—Plate removed from case in which brain substance was in contact with plate. Removed after six years on account of epilepsy. Note new dura formed and smooth surface on scalp where it came in contact with plate.

necessary. In extradural hemorrhage the clot appears as soon as the trephine opening is made. The Devilbiss trephine is the safest instrument I know, making a small opening but pushing a disc of bone ahead of it (Fig. 3). The Devilbiss rongeur enters into this small opening and the opening can be enlarged until of sufficient size to admit the ordinary rongeur. The bone is cut away until the opening is large enough to cover the clot area.

The clot can be curetted out with a dull curet or with curved artery forceps wrapped with gauze. Sometimes much more successful work can be done by inserting the finger between the bone and the dura and raking out the clots. The clot in extradural hemorrhage is thicker in the center and shades off to a thinning edge toward the front and back, but often extending over the whole lateral region of the skull.

As stated above, I have never encountered a subdural hemorrhage that had not spontaneously stopped. The extradural hemorrhage requires ligation of the middle meningeal artery, which can be accomplished by carrying a fine catgut ligature around the vessel on a small needle.

The dura should be closed with fine catgut without drainage. The scalp wound is closed with a fine catgut suture, made continuous, with long jumps between the stitches so as to allow for drainage without putting a drain into the wound. This closure can be accomplished in a very short time and a continuous suture controls a scalp hemorrhage and does away with the necessity of tying arteries in the suture line.

The question as to whether it is best to cover these openings in the bone or to leave them covered only by the scalp is one that has been much discussed. Following the use of celluloid in other parts of the body, with proof of its nonirritating qualities, the writer in 1904 presented to

the Southern Surgical Association the report of a case in which a plate was placed in the forehead following an operation of a brain cyst, and the result was so exceedingly satisfactory that they have been used constantly since that time. The only surgical objection I know to its employment is the fact that it is too easy and simple to do. In this age simple operations do not meet with ready acceptance. For instance, to remove a rib to close a bone opening is in itself, under some circumstances, a dangerous and uncertain operation subject to many contingencies as to future success. Application of a celluloid plate is simple in detail. A plate of celluloid is trimmed to about the desired shape and size and sterilized by boiling or by soaking for twenty-four hours in corrosive sublimate solution. When needed for use, boiling water is brought to the side of the operating table and the plate emersed until flexible, and it can be bent to the desired shape and fit the skull as smoothly as possible, so as to leave no projecting angles to push against the scalp. If the dura has been destroyed the plate rests directly against the brain substance. Resting upon the bone edges has the advantage also of allowing the space of thickness of the skull for decreasing the internal pressure. Formerly these plates were wired in with silver wires, but I have found that nothing is more satisfactory than tacking the plate directly to the skull with three-ounce carpet tacks. This can be accomplished by placing the plate over the opening and around the edge, drilling with a fine drill through the plate and slightly into the skull, to give a starting point, as the tack cannot be driven into the undrilled bone. See Fig. 6. Should a drain be necessary, a notch can be cut into the edge of the plate with a rongeur and the drain brought out through this. See Fig. 7. All of these details can be carried out very quickly, shortening the operative procedure, which means so much in many of these cases in which the legal phrase so often applies, "Time itself being the essence of the contract."

The question of brain drainage is a very serious one, as infection is very prone to follow it, and it is undoubtedly true that it should only be done where it is absolutely necessary. A question that often comes up in the use of the plate covering the brain is a tendency of quite an amount of brain fluid to appear between the plate and the scalp. There is a strong temptation to empty this, but many of the infected plate cases that I have met have largely come from this. In handling the plate cases that become infected, it always becomes necessary to remove the plate and tacks, but if sufficient time is left before doing so, even when there has been no dura, Nature has formed a strong covering that supports the brain and prevents hernia, so that even when removed a very useful purpose has been served.

An interesting observation is to see how Nature takes care of these cases where a plate has been in position for some time. It will always be found that not only has a strong covering formed under the plate, but Nature has made the scalp where it rubs upon the outer surface of the plate smooth and glistening like a serous surface. See Fig. 9.

Conclusions. 1. In all cases of traumatism to the head, with or without fracture, where a patient recovers consciousness and subsequently becomes unconscious, the cause is practically always hemorrhage.

2. Hemorrhage in these cases may be extradural or subdural—the former being more immediate, the latter occurring sometimes days or weeks after the beginning.

3. Such cases always deserve an exploratory operation, and hemorrhages are usually easily found.

4. Such hemorrhages, when not relieved, result in more or less extensive cysts, which disable the patient and destroy his usefulness.

5. Exploratory operations upon the brain are no more dangerous than those upon any other parts of the body.

DISCUSSION

Dr. Samuel J. Mixter, Boston, Mass.—The very instructive cases of the essayist bring out several interesting points, one of which I wish to speak of specially, and that is the length of time that may elapse between an injury and a severe hemorrhage. In some of these cases we have apparently a slight hemorrhage to start with which stops spontaneously. In the course of hours or days, a varying length of time, we will have a massive hemorrhage and the sudden onset of symptoms. This is very well illustrated in the case of a boy who was thrown from his horse and received an injury for which he was brought to the hospital. This was before the days of the roentgen ray and there was no fracture that could be detected. He recovered consciousness in a short time and apparently was on the road to recovery. About a week after the operation I saw him in the morning and went to the operating room, and while I was operating, a neurologist, who had been watching him with me, said, "Why don't you do something for that boy?" I replied, "The boy is all right. I saw him about half an hour ago." He said, "He is dying." I replied, "Bring him down to the operating room right away." The boy was brought down and was absolutely unconscious. I had him hurriedly prepared; he required no anesthetic whatever, and on opening the skull there was a large amount of blood (fresh blood) with a spurting middle meningeal artery. There was only a small tear in it and a bit of old clot. It was a case in which the first hemorrhage had stopped and the secondary hemorrhage came on a week afterward. Such cases show the importance of tying the vessel. This emphasizes the fact that in all cases of head injury where a patient has been unconscious after having received a severe blow on the head they must not be allowed to go around about their business for a long time. I think in a great many of these skull injuries the bad results we get are largely due to the fact that they are not kept quiet and under observation long enough. They must be where they can be operated on at a minute's notice if necessary. This boy had not been bleeding more than fifteen minutes, and another half an hour would have finished him.

Dr. E. Dunbar Newell, Chattanooga, Tenn.—Almost all men who do a good deal of head surgery know and fully realize that every case of serious injury to the head, whether the patient is unconscious or not, should be kept in bed for at least ten days flat on the back. It is very important to watch these cases closely, and if they are watched closely, if there is a hemorrhage, it can be detected early and practically all of these patients can be saved. It is necessary to look out for the focal lesion. Dr. Nicolson has shown very clearly how hemorrhage occurs in these cases. It is also necessary, where you do not get focal symptoms, if the blood-pressure should go up and there is increased intracranial pressure, as denoted by the spinal mercurial manometer, for that patient to be operated on at once, do a subtemporal decompression and put a rubber tissue drain in the middle fossa. Even if one does not find hemorrhage, if he establishes drainage in the middle fossa and if the dura is widely opened and is left open it is remarkable how many of these cases he will save.

It is interesting to note in how few cases of traumatic brain lesions we find rupture of the middle meningeal artery or its branches. We have on an average 25 of these cases of serious brain lesion a year and do not average 10 per cent where there has been a rupture of the middle meningeal artery or its branches. In our early study of these cases we thought the usual cause of the trouble was a rupture of the middle meningeal artery or its branches, but we found that is not true after increasing experience. We found injury to the brain substance itself or a basal fracture in the serious injuries was the cause of the trouble in about 90 per cent of our cases. This is very easy to detect when we have serious lesion. As long as these patients are getting along comfortably, are conscious, and their mentality is becoming more and more alert, let them alone, keeping them in bed with head low, and do not operate. However, the minute they begin to have mental sluggishness and the pulse-rate goes up, and the blood-pressure begins to fall, and the cerebrospinal pressure as noted on the spinal mercurial manometer registers about 16 mm. or over we had better operate at once. If one does not operate on them early and if he waits until the medulla has been worn out they invariably die.

Dr. Harry H. Kerr, Washington, D. C.—This paper, in my opinion, proves the contention of the last speaker (Dr.

Newell) that we have got to come around to the question of immediate operation in cases of intracranial injuries. The author presents a series of cases of hemorrhage that menaced life late in the disease. They constitute an interesting group. But the old question of operation in fracture of the base of the skull can, I think, be reopened and something added. We have learned a distinct lesson from war surgery. A series of cases that were operated on and other series that were not operated on in pre-war times furnished evidence that nothing is to be gained by early interference. But in these cases a general anesthetic was used. With local anesthesia the results are much improved. If those cases of fracture of the base of the skull that show distinct pressure either immediately after injury, or accumulating pressure as observed by the spinal mercurial manometer or by an examination of the eye-grounds, are decompressed under local anesthesia I believe much good can be accomplished. They should be operated on in the head-high position under local anesthesia and a subtemporal decompression made. It is unnecessary to drain. The relief of pressure and decompression is the indication. In certain cases we will find middle meningeal hemorrhage, but the vast majority of cases have hemorrhages from the very small arterial branches in the basilar dura and the relief of pressure is the principal objective. Hemorrhage is a secondary consideration.

I would differ with the essayist as to the method of repair of skull defects. I believe an osteoperiosteal graft from the neighborhood is indicated rather than the celluloid plate.

Dr. C. C. Coleman, Richmond, Va.—I think one of the most important features in the essayist's paper is the fact that he does not stress bone injury. In other words, he emphasizes the importance of a lesion of the brain rather than a fracture of the skull. The record of the eye-findings in a study of these cases would be instructive and I am interested to know whether these patients showed a blurring of the disks. I do not believe we often get in the cases of recent head injury very important information from a study of the eye-grounds. In this very unusual series of cases of delayed compression due to blood clot one would naturally expect to find some blurring of the disks comparable to that which results from the slowly accumulating pressure of a brain tumor.

Indications for operation on traumatic head cases in which

there is no extradural hemorrhage are not well standardized. I feel that many of these cases without marked intracranial pressure are operated upon, whereas many that have dangerous intracranial tension are not given the benefit of decompression, which may not only save life but protect the patient from the serious later effects due to long-continued pressure. In my experience cases of middle meningeal hemorrhage constitute an insignificant proportion of the head injuries, so that the indications for operation in the average head case cannot be formulated upon so exact a basis as in a case in which there is manifest extradural compression.

Too much emphasis has been given the period of secondary unconsciousness following a conscious interval in cases of rupture of the middle meningeal artery. If these patients are carefully observed it will generally be found that certain disturbances precede the development of the secondary period of unconsciousness. It is important to recognize these disturbances promptly, because if operation is postponed until profound unconsciousness sets in the patient's condition is a serious one and may not be benefited by operation.

Middle meningeal hemorrhage occurs over an area peculiarly responsive to compression stimuli and focal disturbances should be promptly recognized.

Dr. Alexius McGlannan, Baltimore, Md.—I think we are all perfectly in accord that we should operate on head injuries that show distinct pressure. The difficulty is to be certain of the mild degrees of pressure in which operation should be done. Anything that helps will be welcome and the work of those specializing in head injury may help us to recognize mild degrees of pressure which require operation and save us from operating on patients with smaller degrees of pressure who would get well without operation.

The cases of delayed hemorrhage which follow head injuries are of great interest and importance, and during the fall I had a patient whose case resembled the one reported by Dr. Mixter. The patient, a child, fell from a second-story porch, was brought into the hospital unconscious. A roentgen-ray picture showed a fracture of the skull. There were none of the ordinary signs of increased pressure within the skull but there was unconsciousness and dilatation of the pupil, from both of which the child gradually came out. He had control of his pupils the

same night and he passed from a stage of irritability into what looked like perfect consciousness in about twenty-four hours. Nothing was done. The child was kept in the hospital. On the fifth day, early in the morning, the child had a convulsion, and after that he had a spastic right arm and hand with tremulousness. At the operation the motor area was exposed by a flap incision. We found a torn dura and hemorrhage coming from one of the veins of the dura. The vein was ligated; the dura was not repaired; the flap was put back and the scalp closed without drainage. In twenty-four hours the child was using his arm. I do not see how we could have known he was going to bleed five days after his injury.

Dr. Nicolson (closing the discussion).—I do not know of any way to account for the delayed hemorrhage in these cases. It is an interesting thing. Most of these hemorrhages were not of the middle meningeal artery but were subdural hemorrhages. We never knew where the blood came from because it stopped spontaneously before we reached the brain.

In regard to the question of making an osteoplastic flap and the operation with trephine and rongeur, I disagree with what has been said in the discussion because the middle meningeal artery can be demonstrated just as soon as one takes a piece of bone out and one can see the clot at once. There is no use in opening the whole side of a man's head if one can do it through a small opening. I presume I am partial to the celluloid plate because I introduced these plates to this Association sixteen or seventeen years ago and have used them a great deal ever since, and am using them all the time. As to when to operate in these cases I would also say that these operations were based entirely upon clinical evidence. I recall one young man whose automobile turned over and dislocated his wrist. He was picked up in a drowsy condition from the injury. The next day he was still more drowsy, and spinal puncture showed a great deal of blood in his spinal canal. We opened his skull and was never able to detect where the hemorrhage was. I have seen one case in which a decompression overcame a case like that and the man recovered with a paralyzed side.

Dr. Long.—What becomes of the celluoid plate, do you take it out?

Dr. Nicolson.—I have taken these plates out a number of times. I took out one that had been in place for seventeen years on account of another cyst having formed. The plate was just as it was put in there. In these cases, months afterward, nature forms a new dura which holds the brain in without any trouble. The scalp where it grows over the plate is covered as with a serous membrane and the plate stays in there undisturbed. I used to put these plates in with silver wire; now I nail the skull with carpet tacks without any trouble whatever. I nail them to the outside of the skull, cover the plate and it remains there without any disturbance, and where a plate is used in the forehead one would hardly know it was there.

BENIGN LESIONS OF FEMALE BREAST FOR WHICH OPERATION IS NOT INDICATED

By Joseph Colt Bloodgood, M.D.
Baltimore, Md.

It seems almost incredible, yet it is true, that in the last 100 women whom I have seen because of some complaint referred to one or both breasts, in more than one-half, after a history and careful examination, operation has been advised against. The cases to date total 267; the majority were observed during the last five years. They have been designated B. B. N. O. (breast; benign; no operation), and will be considered in eleven groups: (1) pain, 64 cases; (2) painful scar, 22 cases; (3) discharge from the nipple, 36 cases; (4) retraction of the nipple, 3 cases; (5) lesions of the nipple suggesting Paget's disease, 3 cases; (6) history of disappearing tumor, 24 cases; (7) definite and indefinite, single and multiple tumors in women under the age of twenty-five, 23 cases; (8) definite and indefinite, single and multiple tumors in women over twenty-five, 64 cases; (9) tumors in the axilla—aberrant breast, lipoma, lymph glands, tumors of the sebaceous and sweat glands, 17 cases; (10) unilateral hypertrophy at puberty, 12 cases; (11) diffuse virginal hypertrophy, 3 cases.

Clinical Picture in Different Groups. 1. *Pain.* 50 patients presented themselves complaining of pain only, and the result of the examination was negative; 14 patients

complained of pain, and a tumor had been felt by the patient or the examining physician, or by both, but on careful examination I could not make out any tumor.

The study of these 64 cases of pain in the breast, combined with that of patients who have been operated on for benign and malignant tumors of the breast, teaches us that pain is not an indication of a pathologic lesion in the breast indicating operation. The only compensation for pain in the breast is that it influences the patient to seek an examination and in some instances a tumor may be found earlier, or, if there is no tumor, the patient may receive instructions which will be helpful in the earlier recognition of a tumor, should one develop.

All the different types of pain in the breast have been investigated—intermittent; continuous; localized; diffuse; radiating; unilateral; bilateral; its relation to infancy, puberty, lactation, mastitis, menstruation and menopause—with the result already stated: pain, of itself, is not of diagnostic value.

The best treatment for pain in the breast is to assure the patient, after a careful examination which has excluded the presence of a tumor, that it is not a sign of cancer, and that she runs no more risk of cancer than any other woman of her age who has no pain.

2. *Painful Scar.* These 22 cases comprise only those patients whose operations were performed by other surgeons. When compared with painful scars after our own operations, it can be emphatically stated that pain in the scar is not of itself an indication of a recurrence, nor that there is anything in the area of the healed wound which requires operative treatment. The treatment should be largely psychic. Painful scars are more common after the excision of the breast than after the excision of a tumor or the complete operation for cancer.

3. *Discharge from the Nipple.* In addition to the 36 cases in which operation has not been performed, we have

studied the significance of discharge from the nipple, when present, in all the benign and malignant tumors of the breast operated on and in which the pathology of the lesion was established.

From this study one may state that discharge from the nipple, like pain, is not an indication of a lesion of the breast for which operation is indicated. In malignant tumors of the breasts, such a discharge previous to the palpation of the tumor has been recorded in about 1 per cent of the cases. In all benign tumors the percentage is a little larger. In the benign papillomatous cysts this discharge has been the symptom of onset in more than 50 per cent of the cases.

The probabilities are that a discharge from the nipple of a character other than milk is due to a small papilloma in a duct (discharge bloody or serous) or dilatation of the ducts beneath the nipple when the discharge is thicker and brownish or yellowish. A discharge of milk indicates a galactocele or persisting lactation hypertrophy. There is no evidence that these lesions are precancerous, and the prevailing view that a woman with a discharge from the nipple should be protected from cancer by the removal of the breast is based on fear and not on fact.

4. *Retraction of the Nipple.* When retraction of the nipple is of recent origin and not associated with a history of lactation, it should be looked on as a sign of cancer and the complete operation performed. Retraction of the nipple as a symptom of onset of cancer of the breast is rare. It may be associated with benign tumors, chronic cystic mastitis, lactation mastitis, and the rare type of mastitis not associated with lactation. But it is safer to look on recent retraction of the nipple in which there is no demonstrable benign etiologic factor as a sign of cancer.

In the 3 cases discussed here, the unilateral retraction was of long duration and coincident with lactation.

Unilateral or bilateral congenitally depressed nipples can be distinguished from retraction of the nipple only

when the patient is certain that the condition has been present for years.

5. *Lesions of the Nipple Suggesting Paget's Disease.* Any warty condition of the nipple associated with scaling, discharge or ulceration; any irritation of nipple with redness or weeping; anything suggesting eczema or ulceration of the nipple which does not heal within a few weeks after simple measures of cleanliness and protection, should be looked on as Paget's disease and be treated by complete excision of the breast. If, on palpation, there is any induration beneath the affected nipple, any palpable mass in the breast, the complete operation for cancer should be performed without delay.

The 3 cases mentioned here healed so rapidly under simple treatment that operation was not performed.

6. *History of Disappearing Tumor.* In my opinion, this is a definite clinical entity, and the tumor is associated either with a chronic lactation mastitis, a galactocele or with chronic cystic mastitis. When we study cancer of the breast, in less than 1 per cent is there a history of disappearing tumor before the development of the permanent tumor—cancer. This would correspond somewhat to its rare occurrence in the lesions above described.

When we study the records of lactation mastitis, galactocele and chronic cystic mastitis, we find the statement of a disappearing tumor in a significantly large proportion of the cases—up to almost 20 per cent in chronic cystic mastitis; and as many of the older histories are incomplete as to these data, there is every reason to conclude that the disappearing tumor is more common. When we follow the patients operated on for chronic cystic mastitis who have one or both breasts remaining, the later development of the disappearing tumor is quite frequent. The relative frequency of the history of a disappearing tumor in patients operated on for an encapsulated adenoma is about in the proportion of the probable occurrence of chronic cystic mastitis in women of the same age.

There is also some evidence that the benign adenoma observed in young girls may, if let alone, ultimately disappear.

The nomenclature for definite and indefinite tumors is as follows: (*a*) Single definite tumor in one breast; (*b*) single definite tumor in each breast; (*c*) multiple definite tumors in one breast; (*d*) multiple definite tumors in both breasts; *a-e*, *b-e*, *c-e*, *d-e* indicate that the tumors are indefinite.

7. *Definite and Indefinite, Single and Multiple Tumors in Women Under Twenty-five Years of Age.* In this group there were 23 cases.

(*a*) Single, definite, freely movable tumor in one breast, all in girls under twenty years of age, 12 cases. 7 of these have been followed from three to nineteen years, and the tumors have disappeared. This suggests that adenoma in the breast of a young girl may ultimately disappear.

(*a-e*) Single, indefinite areas, 4 cases. All were followed for years, and the areas have disappeared.

(*c*) Multiple definite tumors in one breast, 2 cases. In both, the tumors disappeared.

(*c-e*) Multiple indefinite tumors in one breast. No cases of this type have been observed.

(*d*) Multiple definite tumors in both breasts, 1 case. I examined this patient eighteen years ago and concluded that the tumors were adenomas. They have since disappeared.

(*d-e*) Multiple indefinite tumors in both breasts, 4 cases. Subsequent examinations revealed that the areas have disappeared.

This demonstrates that the possibility of definite and indefinite, single and multiple tumors in one or both breasts in women from the age of puberty to twenty-five may occur, but certain types are rare.

In view of the fact that I cannot find an authentic case of cancer in the breast of a woman under twenty-five years

of age, it seems just to conclude that there is no danger in observing a definite single tumor or multiple definite tumors in one or both breasts. To be on the safe side, I have reduced the age limit to twenty years.

The indication for operation on a single tumor or multiple definite tumors in one or both breasts in a girl twenty years or less of age is: Size, recent rapid growth, extreme pain, and prospect of early marriage.

8. *Definite and Indefinite, Single and Multiple Tumors in One or Both Breasts in Women Over Twenty-five Years of Age.* In this group there were 64 cases.

(*a*) A single, definite tumor in one breast; no operation; 7 cases. The operation was postponed in spite of the fact that a single, definite, palpable tumor was present in a woman, aged twenty-five; in 3 cases, because the tumor was felt in a lactating breast and was thought to be a galactocele; in 1, because there was a history of the removal of a simple cyst, and in 1 case the small palpable tumor beneath the nipple was wormlike and suggested a dilated duct.[1]

The tumors in these 5 cases all disappeared, and there has been no further trouble.

The remaining 2 patients refused operation. In 1 the tumor had been diagnosed in 1892 as cancer. It disappeared in a few months, and there had been no recurrence in twenty years. The other was diagnosed a subepidermal dermoid. This patient has been lost track of.

This demonstrates that during a period of about thirty years, in almost 3000 cases of breast lesions, I have records of but 5 cases in which operation has been postponed when the examination revealed a single definite tumor in one breast in a woman at the cancer age, and I have given my reason which justified delay.

(*a-e*) Single indefinite tumor in one breast; no operation; 21 cases. Here operation was postponed, because the first and subsequent examinations failed to reveal on palpation a local area sufficiently definite to justify exploration.

In 6 of these cases there was the history of a trauma; 2 were associated with lactation; 1 with an old mastitis. In 7 cases, pain brought the patient for examination; in 5, the patient had felt a tumor. All of these patients have been followed, and the indefinite lesion has disappeared.

(*b*) A single definite tumor in each breast; no cases; all have been subjected to operation.

(*b-e*) A single indefinite tumor in each breast; no observations.

(*c*) Multiple definite tumors in one breast; no observations; all subjected to operation.

(*c-e*) Multiple indefinite tumors in one breast; no operation; 1 case. In this instance the palpable indefinite area followed contusion, disappeared under observation in a few months, and there has been no recurrence after three and one-half years.

(*d*) Multiple definite tumors in both breasts; no operation; 7 cases. Operation was postponed in these cases, because in 3 the multiple definite tumors in both breasts were associated with lactation and were looked on as benign galactoceles; in 2 cases because, on palpation, one could feel wormlike tumors beneath both nipples, and the condition was diagnosed dilatation of the ducts, which is not a precancerous lesion.

In 2 cases the palpable bilateral lesion was a diffuse chronic cystic mastitis of the BB-13-8 type.[1]

In all of these 7 cases either palpable lesions have disappeared or the patients are still recent and under observation.

(*d-e*) Multiple indefinite tumors in both breasts; no operation; 50 cases. Operation was postponed in this group because, on careful and repeated palpation, no area of sufficiently definite area could be made out to justify exploration.

Among these 50 cases of multiple indefinite tumors in both breasts, in 7 there was a history of the removal, some

time previously, of a benign tumor. In 6, this tumor was a blue-domed cyst; in 1 case, an encapsulated adenoma.

The age of these patients has varied from twenty-four to fifty-four years. It is becoming a very common condition. In the first decade up to 1900 I have a record of 3 cases; in the third decade, from 1910 to 1919, 21 cases. If the present rate keeps up in the fourth decade, since 1920, there will be 60 cases.

In a previous paper[1] I have discussed the palpation of single and multiple, definite and indefinite tumors in one or both breasts, associated with chronic cystic mastitis.

When we go over the histories of benign and malignant tumors and study closely the clinical records we find that in malignant tumors there is recorded a single definite tumor in one breast; rarely is there a record of multiple tumors, either definite or indefinite, while the opposite is true in benign tumors, specially in chronic cystic mastitis. Multiplicity, therefore, of multiple tumors is suggestive of benignity.

Therefore, there should always be a careful examination of both breasts.

The differential diagnosis of breast lesions depends more on palpation than on any other factor in the history and examination.

To distinguish between a single or multiple indefinite tumor and a single or multiple definite tumor requires an acute sense of touch. The palpating fingers of the examiner should be so trained that they become instruments of precision.

Publicity has brought women who think they have lumps in the breasts so frequently for examination that never before has the medical profession been called on so often to make a differential diagnosis between a lump of the breast which should be explored and one that is part of a lumpy breast in which operation is not indicated.

Older methods of examination were inadequate. In

the first ten years of my experience to 1900, when a woman came to the clinic because she had felt a lump in her breast, with hardly an exception the lump was distinct on palpation, often visible, and in almost 90 per cent of the cases distinctly malignant. In the next ten years a few patients came under observation in whom the diagnosis was really difficult. The number of such cases has been rapidly increasing. Today, in more than 50 per cent of my patients the diagnosis rests on palpation, and the first question to be settled is, Does the breast contain a distinct lump, or is the lump an indefinite one, and one of many?

It should be the invariable rule for the examiner to know nothing about the history of the patient. The history can be taken by somebody else and typewritten. The patient must be told not to say anything to the examiner of what she is complaining, or what she or anyone else may have felt.

The patient should be stripped to the waist, and recline on a couch in the office or on a bed in the hospital, with the head in a comfortable position on a pillow and the arms raised above the head. Before this method was introduced we frequently examined the patient sitting on a chair with arms at the sides.

In this reclining position, with arms elevated, one can inspect better the axillary portion of the breast and frequently see tumors in the axilla (Group 9). Also, in this position one can note at once whether there is any bulging due to a tumor in either breast. I have never observed a small benign tumor to bulge, and up to the present time all such tumors visible on inspection have been malignant, and this bulging has been the only sign differentiating them from the benign.

One should carefully inspect the nipple, looking for warty growths, scaly areas, weeping or any of the signs of early Paget's disease (Group 5). Changes in the areola, its size or pigmentation have no important significance, except

in pregnancy. That one breast is larger than the other and yet retains its symmetry is a common occurrence and of no importance. One breast may be so much larger than the other that it may be called unilateral hypertrophy (Group 10). If not due to this, it is the seat of a large tumor. It is important to note that discharge from the nipple may produce an irritation and be confused with early Paget's disease. The secretion irritates the epidermis and gives rise to scaling and scabbing.

For many years we have made comparative measurements of the radii of the breast and of points between the top of the sternum and clavicle to the nipple, but I have not a record of a single case in which such measurements could be depended on alone for diagnosis, nor have I found them particularly helpful. Inspection, of course, must look for congenital retraction of both nipples, retraction of the nipple, dimpling of the skin, and any changes in color of the skin over both breasts.

It is important to repeat here that it is essential that the examiner receive no suggestion as to which breast the patient thinks is giving trouble, or as to what has been felt by the patient or any other previous examiner.

If the examiner feels a possible lump in the left breast and the previous examiner has felt it in the right breast, this indicates that neither lump is a real tumor and that it is only part of a lumpy breast. It is also important to remember that the first palpation is very likely to increase the consistency of the breast tissue due to congestion. This congestion remains only a few minutes, so that when one feels an indefinite lump in the outer and upper quadrant and then later feels nothing, the correct conclusion is not difficult. These lumps due to congestion are more likely to occur if the examination is made during or just before the menstrual period, and specially in younger and unmarried women.

My method is to palpate the two breasts at the same

time, the right breast with the left hand, the left with the right hand, palpating corresponding areas, never touching the nipple until palpation is completed. This allows one to get at the relative consistency of the same areas in different breasts. Then one should palpate each breast with both hands, feeling specially for the edge of the breast. Then one should place one hand on the different parts of the breast and move the fingers as when playing the piano, palpating the breast between the fingers and the chest wall. This is the most important procedure and should come last, because by this time areas of congestion will have disappeared. Having found a distinct tumor, one should asks the patient where she has felt the tumor. In all of my observations in which there is a distinct tumor, the patient as well as all previous examiners have also felt the tumor in the same area. When there is no distinct tumor, either the patient has sought advice for pain only, or for discharge from the nipple, or the area which the patient and previous examiners have felt as a tumor is one that you have not picked out, or is a different portion of the same, or in the other breast.

In a few instances I have been unable to feel any tumor, even an indefinite one, but the patient has pointed out to me the area in which she has felt the tumor, when to my surprise I also felt it distinctly. Such tumors have always been smaller than a ten-cent piece, freely movable, and removed have always proved to be benign.

When no distinct tumor can be felt, or when there is one indefinite tumor or more than one in one or both breasts, a second careful examination should be insisted on a few days or a week later, and in some cases repeated examinations. But up to the present in only one instance in which the first examination was negative for a definite tumor have I at the subsequent examination made out a definite tumor. In this case the interval was three weeks, the tumor the size of a ten-cent piece, buried in fat in a large breast;

and, when explored, it proved to be malignant. In this case the glands were not involved, and the patient is well more than five years later.

When the breasts are large and the subcutaneous fat thick, palpation is much more difficult.

The responsibility for this careful examination by inspection and palpation is by no means a small one. For this reason it should never be superficial, and should be repeated as often as is necessary. On the one hand, one does not wish to make the mistake of overlooking a definite tumor of the breast, on the other hand, that of performing an unnecessary operation.

9. *Tumors in the Axilla; Aberrant Breast Tissue; Lipoma; Lymph Glands; Tumors of Sebaceous and Sweat Glands.* I have notes on 17 cases: 14 were unilateral, 3 bilateral; 3 were associated with lactation, and 1 with pregnancy. It has been observed from puberty until after menopause. Sometimes the patients had pain which called their attention to the swelling, but more often they simply observed a fulness in the axilla. On inspection, with the arms elevated, one sees a bulging at the periphery of the upper and outer quadrant of the breast in the base of the axilla below the muscle. On palpation, it feels like breast tissue. In these 17 cases nothing was done and no lesion has developed.

In one instance, in a girl after puberty, the mass was large enough to justify its removal. The microscopic section showed normal breast. In a few instances we have observed both carcinoma and benign tumors in this axillary portion of the breast, but in not a single instance was there a record of a previous swelling suggesting hypertrophy of this breast.

The other lesions of the axilla are not of sufficient number or importance to justify a discussion here.

10. *Unilateral Hypertrophy at Puberty.* I have previously discussed this.[2] At that time (1917) I had observed 6 cases. This lesion is not necessarily pathologic. Before, during or shortly after the first menstrual period, one breast be-

comes larger than the other. If palpation reveals no tumor, operation is not indicated. In time the other breast begins to develop, and symmetry is reëstablished.

11. *Diffuse Virginal Hypertrophy.* This was previously discussed.[2] Since then I have observed 3 additional cases, which, however, have not reached the size justifying operation. In thirty years' experience I have seen cancer once in which the patient had diffuse virginal hypertrophy, and in another instance there was an encapsulated fibroadenoma. The clinical picture is distinct, its etiology is unknown, and we do not know of any method of treatment which will prevent its occurrence or check its growth.

References

1. Bloodgood, J. C.: The Pathology of Chronic Cystic Mastitis of the Female Breast with Special Consideration of the Blue-domed Cyst, Arch. Surg., November, 1921, iii, 500.

2. Bloodgood, J. C.: Lesions of the Female Breast, Section 23, vol. i, p. 559, in Binney: Treatise on Regional Surgery, Philadelphia, P. Blakiston's Son Co., 1917.

THE REMAINING BREAST AFTER RADICAL REMOVAL OF THE OPPOSITE SIDE FOR CARCINOMA

By Hugh H. Trout, M.D.
Roanoke, Va.

In a review of 173 operations for carcinoma of the breast, necessarily many interesting and some instructive facts have been ascertained. One of the most useful results of such an analysis, I believe, will usually be found to be that the information so acquired is so disappointing regarding permanent cures as to lessen the conceit of the average surgeon.

We will not present even a *résumé* of the results of our studies in this series further than to discuss briefly the future of the remaining breast, giving special consideration to that rather small group of women coming within the childbearing period and having cancer of the breast. It is more than likely such a consideration would not have occurred to us if we had not happened to have had visits from two such patients within a very short period of time. Both of these visits being so close together, and presenting such an unusual condition of affairs, naturally focussed our attention on the necessity of reviewing all our cancer-of-the-breast cases with the object of ascertaining what effect pregnancy had on the remaining breast after the patient had already exhibited, to say the least, a "tendency to cancer" by having been the host of such a disease on a previous occasion.

With such an object in view we ascertained there were only 31 of these cases in our series under the age of forty years. We were successful in obtaining information concerning 29 of these. Of this number only 2 had become pregnant, and the most important point of this study hinges on the fact that both of these cases developed carcinoma in the remaining breast. Very briefly the essential facts of these 2 cases are as follows:

Case I. Aged thirty-four years. First admitted April 16, 1912. Carcinoma about 4 cm. in diameter in upper outer quadrant of left breast. Known duration of tumor about eight months. Mother of three children—twelve, eight and four years. Nursed all children without trouble and with sufficient milk in both breasts. Tissue and glands removed from the axilla and from under the falciform or triangular ligament did not show any signs of malignant invasion. No glands palpated in supraclavicular region. Sections of tumor showed carcinoma. No pain and no signs of malignant involvement or of mastitis in the opposite breast.

This patient remained free of all symptoms until about one month before her return to the hospital, May 18, 1916—practically four years' interval—at which time she noticed her right breast contained a tumor which could be easily palpated, and this in spite of the breast being considerably larger than normal, due to the existence of a seven months' pregnancy. During the month in which patient watched the growth of the tumor it increased very rapidly, and when examined suggested a zone of inflammatory infiltration for several inches around the tumor. Another radical operation was done, revealing a carcinoma of the upper outer quadrant without involvement of the glands of the axilla and having no attachment to the chest wall.

Four days after operation, while we were debating what to do concerning the pregnancy, the patient kindly solved

the situation for us by expelling a dead fetus. This patient was examined in September, 1921, and is apparently well. She has had no further pregnancies, having been instructed to use all possible precautions to prevent conception. Sections of this tumor were sent to Drs. W. H. Welch and J. C. Bloodgood, both of whom gave the diagnosis of its being definitely malignant.

Case II.—Aged thirty-two years. First admitted June 14, 1911. Differs only from Case I in the following respects: Mother of one child, twelve years of age. After an interval of about six years patient returned on June 6, 1917, being about eight months pregnant, with a history of having noticed a lump in the upper outer quadrant of the right and remaining breast about the sixth month of pregnancy. This growth must have increased very rapidly in size, for not only was the breast involved when she reported to us, but the patient presented many signs and symptoms of a general carcinomatosis. The patient stated that when she first noticed the growth it was not larger than a "small marble," and as far as could be ascertained from her history she did not have any symptoms of chest or abdominal involvement until about one month before her return to the hospital. No operation was advised, but she died on June 18, 1917. The family refused to allow an autopsy, so all the information we could obtain was through an abdominal incision which the undertaker was persuaded was necessary to properly embalm the body. This showed a general involvement of the abdominal viscera, being most extensive in the liver. The fetal heart sounds ceased four days before the mother's death. Apparently there was no involvement of the uterus. No tissue was obtained at the autopsy for microscopical sections.

A review of the literature shows many authors expressing the belief that there is some association between mammary

changes due to pregnancy and carcinoma of the breast. Such a hypothesis is most natural, and especially so when one recalls the histological anatomy of the breast with its numerous lobes, lobules, and large number of acini lined with epithelium and richly supplied with capillaries. This complex picture is made even more confusing by the marked changes, specially in the epithelium, incident to the preparation for lactation. In a slight deviation from normal in such a complicated transformation one can find ready application for any of the usually accepted theories concerning the etiology of carcinoma.

It is more than probable there are additional factors other than the normal changes in the breast incident to a pregnancy and of these factors none holds a higher place in the realm of present-day theory than the role played by any chronic irritation. We all recall, a few years ago, Dr. Bloodgood sending to numerous pathologists slides of questionable diagnosis between chronic mastitis and malignancy. The microscopical diagnoses received after such an extensive study from so many different sources varied so greatly as to convince many surgeons there must be a close association between these two conditions.

In considering the causative factors of mastitis, certainly pregnancy ranks high. In a recent reply from Dr. Walter E. Sistrunk, of the Mayo Clinic, he states: "For some time I have felt that, when a patient has carcinoma in one breast and a definite mastitis in the other, both breasts should be removed, on account of the fact that I have on several occasions seen a carcinoma later develop in the breast where the mastitis was present. This may be done at one operation or as a second operation, according to the difficulty of the first operation."

As a study of the literature did not reveal a report of any effort having been made to determine the future of the remaining breast in the advent of a pregnancy in this class of case, we wrote to a number of our surgical friends,

and an analysis of sixty-two replies received showed very clearly no such postoperative "follow-up" has been made. Forty-six out of this number volunteered the information of having noticed that pregnancy apparently stimulated cancer to develop more rapidly, no matter where the growth might be located.

In this series of replies there were 17 cases of carcinoma of the breast associated with a pregnancy reported. All these cases were seen late in the disease and all went to a rapid and fatal termination. This collection of cases had not been preceded by an operation, and as this information was volunteered, there were probably numerous other cases not mentioned.

One very interesting and the most important point ascertained from these replies is found in the fact of there having been only 15 instances in which pregnancy is known to have occurred after removal of a breast for carcinoma. Of this number 13, or practically 87 per cent, developed carcinoma in the remaining breast, 12 of whom died very promptly. The interval period between operations and recurrences associated with pregnancy varied from two to ten years.

Dr. Irvin Abell states he has had only 1 case become pregnant, "and she had an induced abortion at the end of the third month; this abortion was done in the fourth year following operation, now two years ago, and the patient remains well." This case was not listed because it is impossible to estimate what would have happened if the pregnancy had been allowed to continue. Certainly the abortion was induced because of fears of the damage resulting from continuation of the pregnancy.

We did not include in this estimate a case reported by R. L. Payne of a woman having had a radical breast amputation on the right side at the age of forty-one years. "At the age of forty-five her menstrual flow stopped suddenly," and she reported back to Dr. Payne with symptoms sug-

gesting pregnancy and a definite lactation in the left and remaining breast. There was no pregnancy present, but Payne expressed the opinion that "lactation had evidently been incited by the fear of pregnancy." Twelve months after lactation ceased Payne did a "radical amputation of the breast, which showed in the laboratory infiltrating adenocarcinoma just below the nipple in the upper quadrant. This last operation was in 1910 and the patient is still living."

Due to the numerous classifications at present employed in different clinics, we thought best simply to use the term carcinoma and not attempt any differentiation in type.

Fred L. Hoffman, LL.D., etc., statistician, Prudential Insurance Company of America, was unable to give any data on the occurrence of cancer in the remaining breast either with or without the existence of pregnancy. No further information as regards such percentage can be obtained from literature or from replies received from these 62 surgeons, though, as we all surmise, recurrences are apparently more apt to occur in younger people than those of the sixth or seventh decade.

In the reply received from James F. Mitchell he reports a case having a thirteen-year interval and then developing carcinoma in the other breast, but not associated with a pregnancy.

In a review of 218 cases of carcinoma of the breast from Rochester, Minn., 10 per cent more of those over fifty years were alive from five to eight years after operation than of those under fifty-years, suggesting there might be some ground for the rather prevalent opinion "the younger the patient the more active the malignancy."

If these observations and deductions are correct, we believe surgeons should warn their patients who are in the childbearing period, and from whom a carcinoma of the breast has been removed, not to become pregnant for fear of serious trouble in the remaining breast.

In our 27 cases under forty years of age who did not become pregnant there was not a case of recurrence of the cancer in the remaining breast, although the recurrences elsewhere in the body were much higher in this group than in the rest of the series, all of whom were over forty years of age. Of this group over forty years of age we obtained definite information from 106, 10 of whom, or about 10 per cent, developed cancer in the remaining breast, and this in spite of the fact of our recurrences elsewhere in the body being as high as most of the recently published reports.

DISCUSSION ON THE PAPERS OF DRS. BLOODGOOD AND TROUT

Dr. J. Shelton Horsley, Richmond, Va.—Dr. Bloodgood has certainly put the whole surgical profession under a great debt of gratitude for his work in the pathology of tumors of the breast.

Since reading his article and going over the pictures I have found at least one case that I had thought could be accurately classified as cancer which I have now put down as a benign growth. There are, of course, some shades of difference in which it is quite difficult to tell whether the structure is cancer and to depend on one or two cells that look like cancer cells is a very fine shade of difference, which is probably much finer than most of us can draw.

The general principles he laid down can be appreciated by anyone sufficiently interested in pathology to study his own cases, and that I think is necessary to have a real foundation for surgical therapy in these cases.

Dr. Charles H. Peck, New York City.—I think we owe a debt of gratitude to Dr. Bloodgood for the great care he has taken in the study of this group of breast cases, especially the benign group. His classification is much more elaborate than most of us have attained, but a study of it is extremely helpful in explaining the different types of tumors that we meet in the breast, especially of the benign group. I think, too, the stand he

has taken against the mutilating operations in cases of benign cysts and tumors of the breast is one which can bear a good deal of emphasis. We have all seen many cases in which mutilating operations have been done unnecessarily because the surgeon did not have the courage to make a diagnosis of a benign lesion, and to protect himself did a radical operation when it was unnecessary. I have seen many distressing instances of this sort, as we all undoubtedly have.

As to selecting cases of tumor of the breast in which operation can be omitted altogether, I think that is a very difficult question to decide. I have followed the old rule of advising every woman with a definite lump in the breast to have it removed. If the lump is removed in a conservative way through the incision we usually use, curved at the lower border, removing the cyst or tumor from the deep surface, it gives no mutilation whatever. If care is taken to remove the tumor with a block of tissue, to carefully resuture the breast upon itself, one can be on the safe side; determine definitely what the tumor is by immediate pathologic examination, and if benign do an operation which leaves no mutilation whatever.

We have had in a period of ten years, between January 1, 1910, and January 1, 1920, on the second surgical division at the Roosevelt Hospital, 136 cases of the benign group and in the same period 195 cases of malignant tumors. In the benign group there were 23 single cysts; 18 were classed as local cystic mastitis in which an area contained more than one cyst; 13 of general cystic mastitis; 9 were classed as papillary cyst adenomas; 2 galactoceles; 50 under the general classification of adenofibroma, which would include a number of Dr. Bloodgood's subdivisions; 14 as intracanalicular fibroma, 3 cases of tuberculosis; 2 lipomas and 2 hematomas diagnosed as benign tumors at the time.

Of these 136 cases secondary operation has been done in only 4; in 2 of them single cysts occurred a year later and were excised; in one an overlooked adenofibroma in the same breast was excised a month later; in one tuberculosis occurred in the opposite breast which was excised six months later. In the remainder of these cases we have had 2 in which carcinoma developed, but in both of these a radical operation was done primarily. One of them, the daughter of a physician, insisted on a primary radical operation, although the tumor seemed benign and was so reported by the pathologist. She had re-

currence a year later which soon proved fatal. The other case also had a complete primary mastectomy with the removal of the axillary glands. The rest of the group, many of which had partial operations, have remained well as far as we know, and we have traced over 90 of them recently. I wish to emphasize the point that a mutilating operation is a serious thing to do unless necessary; that there is no excuse for doing a radical operation for benign lesions if reasonable care is taken in making a diagnosis, local removal of the mass being quite sufficient.

Dr. Rufus B. Hall, Cincinnati, Ohio.—Like the previous speakers I wish to express my appreciation to Dr. Bloodgood for his very excellent presentation of this subject.

We all appreciate the fact that in many of these cases of tumors in both breasts in women under thirty-five years of age there is not much difficulty in making the diagnosis, but there are instances coming up in patients of that age in which the difficulty in diagnosis is much greater and more exacting, and it is concerning that class of cases I wish to speak.

Like the previous speaker has said, I think we all owe much to ourselves and to the patients to make a positive diagnosis, and that is not always easy by an examination of the patient or by the clinical history, and there is much depending on a correct diagnosis. Everything to the patient is dependent upon a correct diagnosis if the tumor happens to be malignant or if the diagnosis is one of nonmalignant tumor. I have a case in mind just now. A woman came to me some four or five years ago; she was married and had never had any children. She was about forty years of age. I could outline a very small tumor in her left breast and none any place else. I could not make a diagnosis of malignant disease, and she was one of those peculiar women who wanted a positive diagnosis before she would have any operation done. I insisted on removing the tumor in order to make a diagnosis. She would not let me do that. She went to another man who made a diagnosis of nonmalignant disease and treated her for more than a year before he corrected his diagnosis. At the end of that time it was not difficult for him to make a diagnosis of cancer, and in another year and a half she was dead from malignant disease. I could cite several other instances.

In these cases where we are in doubt I think it is our duty

to the patient to remove the tumor and prove it is cancer or it is not. It is up to us to make a correct diagnosis. That is the reason these patients come to us. That has been my mode of practice and I am sure it is correct, and it is the way I am going to continue to practice until I am able to make a diagnosis as readily as Dr. Bloodgood without operation.

Dr. I. S. Stone, Washington, D. C.—I should like to call attention to one point. There is in Washington a patient who is thirty-five to thirty-eight years of age, the mother of three children, who has consulted the best surgical and conservative opinion as to a condition which she has had for more than two years. She has a bloody discharge from the breast and I am much pleased to have heard what Dr. Bloodgood had to say regarding that matter. She has no lump whatever to be found in either breast. The left breast has occasionally discharged blood, otherwise she was when visited in as good health as ever. Bearing children had no effect. There was no anemia as far as could be ascertained, although the woman has always been very white. The pallor, however, was not altogether due to anemia. I think I was the fifth man that she consulted, and after taking the history of the case into consideration I decided that this woman did not need to have her breast removed. She was pregnant at the time I saw her. Five or six months have passed and no change has occurred. Her baby was born all right and yet that woman has been so impressed with the fear of cancer that her husband a few weeks ago decided to have the breast removed, and probably both breasts. No case of carcinoma of which I have any knowledge has existed for two years, so gentle in its course and so slow as not to have manifested some other symptoms than a small quantity of blood exuding from the nipple. In every case I have seen where a serous fluid existed I have refused operation on such an indication when the discharge had persisted for a considerable length of time without other manifestations of disease. I have no recollection of being mistaken in my judgment about that matter.

A word with regard to the removal of both breasts in a young woman because she has evident masses or small or large tumors of some sort. There are two sides to this question, and the utmost care must be exercised to avoid unnecessary mutilation.

I am very pleased to have had the opportunity of listening to Dr. Bloodgood's paper.

Dr. John H. Gibbon, Philadelphia, Pa.—I think Dr. Bloodgood is to be congratulated on having brought to bear on this very interesting subject something more than surgical skill. He has brought to bear upon it surgical judgment based on a large experience and a careful study of these cases. It is the most interesting report of this class of cases I have heard in a long time. It has been a great comfort to me personally because I have been criticized for my conservatism in dealing with these breasts. I have watched these nipples from which serous fluid could be expressed for years and have yet to see one case develop carcinoma. I was also glad to hear him state how wrong it was to operate for pain only. Since the cancer propaganda is so widespread women are constantly turning up for examination complaining of pain. They had none until they read this literature, which I think is good literature to pass around; but when it comes to the treatment of cases we must exercise judgment. One mistake, however, which I have made, and which I think all are likely to make, is in reassuring patients to too great a degree, so much so that they go away and say that Dr. Smith or Dr. Jones said there was nothing in the breast and "that I need not worry about it." I have had one sad experience of this kind. I had one patient who came back in a year with carcinoma of the breast. I think the only thing to do with these cases is to impress upon them that they must be examined at regular intervals, but I do not think that because a woman has some induration in the lower and outer quadrant of the breast she should be subjected to such a mutilating operation as amputation of the breast.

Dr. John M. T. Finney, Baltimore, Md.—While I was not present when Dr. Bloodgood read his paper, I have heard him discuss this subject on previous occasions and I can imagine what he said. One trouble about this whole question is that we are inclined to generalize too much from the remarks of a man who is an expert in regard to this question as Dr. Bloodgood is. We are not all Bloodgoods. I am glad that Dr. Bloodgood lives in Baltimore because I can get the benefit of his opinion, although I may not always agree with him. The real kernel of the nut is this: When a woman comes to you with a lump in her breast the one question of real importance to be decided is whether or not it is malignant, and it is up to

you to be on the job every minute and not to lose a moment until that question has been decided. How are you going to do it? In one of two or three ways. Watch the case and wait for definite signs of malignancy to develop or else make an incision in a doubtful case; make a frozen section diagnosis if you wish and go ahead and operate if malignant.

I should like to ask Dr. Bloodgood whether a greater number of mistakes are made in those cases that have been operated on with a diagnosis of malignancy and a benign condition found or whether in those that are operated on for a benign condition and subsequently found to be malignant?

Another point: In some of these cases it is extremely difficult to make a diagnosis, and all the time it is getting to be more so. The cancer propaganda is making the diagnosis harder for us. Women come to us with imaginary tumors the instant they think they find anything, and it is up to us to make a diagnosis. When we first started, many years ago, we could make a diagnosis across the room—it was so far advanced any fool could make a diagnosis then—but now we are confronted with the greatest difficulty in making an early diagnosis. I have had the unfortunate experience once or twice in putting off cases I thought were benign and then by and by they came back with undoubted malignancy. That has happened often enough to make me feel that I want, in a doubtful case (and a lot of them are doubtful in my mind), to make an incision and be prepared to go ahead and operate immediately and then my conscience is relieved.

The case reported by Dr. Trout is a most interesting one. The last case I saw before leaving home for this meeting was a woman of forty, on whom I had operated within two months for an extensive infiltrating scirrhus. She had no lump but an infiltration of the whole breast; the glands in the axilla were as large as hickory-nuts. She made a perfect recovery. She came to me the day before I left home with the other breast identical with the first one. She had nothing two months ago in the second breast so far as I could determine.

Dr. C. Jeff Miller, New Orleans, La.—Dr. Stone in his discussion brings up a very interesting point and makes us appreciate more fully the responsibility we assume in deciding what shall be done with masses in the breast. To adopt the attitude that every lump in the breast should be removed

promptly will lead to disastrous consequences. It requires as much experience and diagnostic skill to differentiate the different pathologic processes of the breast as in any field of our work and I am confident that breasts are frequently unnecessarily sacrificed.

Dr. Stone asks what advice we are to give young women who complain of pain in the breast, presenting a small lump and occasionally suffering with soreness, particularly over the pectoral muscle. I have found that breast symptoms in many cases are secondary to pelvic pathology. This occurs so frequently that I never express a definite opinion regarding indeterminate breast lumps or pain without a pelvic examination. There is usually a history of irregular menstruation and dysmenorrhea, and the correction of such conditions will usually relieve the breast symptoms.

The question of whether or not a growth in the breast requires removal admits of no argument, but there should be an exhaustive study of cases of so-called cyst adenoma, chronic mastitis and temporary breast discomforts in young woman before surgery is advised.

Dr. J. Wesley Bovée, Washington, D. C.—I rise to endorse some of the statements I have heard made in connection with this discussion, and one particularly in referring to the apparent benignity of bloody discharges from the nipple.

I am watching one woman I have had under observation for five years with a bloody discharge recurring every few days during the entire five-year period, in which there is still no lump in the breast, and it will continue longer, for I am not inclined to do anything in a surgical way for it.

I should like to mention a case of a woman with lumps in both breasts who came to me eighteen years ago and for whom I did a vaginal myomectomy, removing fourteen fibroids from the uterus, The lumps in the breasts disappeared and up to two or three years ago, when I last saw her, she had no growth or enlargement in the breasts.

I think it is very important to follow the suggestion that Dr. Miller has given, namely, to examine the pelvic structures for local irritation for masses within the breast concerning which you are actually in doubt as to their being malignant, and particularly if both breasts are involved.

Dr. Lomax Gwathmey, Norfolk, Va.—Following the first presentation of this subject several years ago we had a case of bleeding from the nipple. The patient was treated on a conservative basis with the removal of a quadrant of the breast, which was sectioned serially and showed only apparently papilloma. This patient subsequently developed cancer in that breast and was operated on about a year ago, showing definite cancerous changes, so that occasionally these bleeding cases do develop cancer.

Dr. F. W. Parham, New Orleans, La.—There is only one point I wish to mention in connection with Dr. Bloodgood's paper. He called attention to the method of examination and laid considerable stress on it. I remember one particular case, the wife of a doctor, who came to me from a very good man, stating she had a tumor of the breast which should be removed. I examined her breast carefully and could not find a tumor, and that is the point I desire to call attention to —the method of examination. Dr. Bloodgood has been over this very carefully, but he omitted one point which I have considered of some importance in examining breasts. He spoke of laying the hand on the breast and going systematically over it, but he did not state the details of a systematic examination. I have been in the habit of teaching that when a breast is to be examined one should never take the breast up between the thumb and fingers, but the examination should be made at right angles to the breast, and that is where a mistake was made in this particular case, and one which I have seen frequently made in supposing that a lump exists in the breast. Regardless of whether the lump can be taken out or not one should first determine whether there is or is not a lump in the breast. I think probably Dr. Bloodgood meant to state that. I thought it worth while to call attention to this, since I have been able to correct some mistakes by making the examination in that way—vertical palpation—and if one discovers that a tumor does exist in the breast he may take it between the thumb and fingers and make a more careful investigation of it.

Dr. William D. Haggard, Nashville, Tenn.—I think a great many practitioners make the mistake that has been spoken of, and in common with Dr. Parham I wish to say that I have

had doctors who have insisted that a tumor of the breast should be removed that could not be demonstrated when the breast is palpated with the flattened fingers against the chest wall and there was no tumor whatsoever. Simply grasping the dependent breast between the thumb and fingers often gives an irregular feel that may deceive one. The seeming tumor will flatten out and disappear when felt for with the finger ends against the chest wall.

Some years ago Bloodgood made the statement, "If you remove a cancer of the breast as the original lump only and then, later, after microscopic study, performed the complete operation for cancer, the chances of a cure were reduced from about 80 to 10 per cent." He has since found that cases that are clinically not recognizable as cancer that have been removed locally and subsequently followed by microscopic study and proof of malignancy have not had recurrence.

I can recall a number of cases in which before the days of the frozen section we have frequently removed a tumor in its entirety and had it examined pathologically, and a few days later removed the breast and most of these cases have had five-year cures. This is becoming more and more frequent and will be the line along which we will make most progress.

I would be glad to have Dr. Bloodgood touch on that point in his closing remarks. While it is important to have a frozen section made right then and there I have seen the other expedient employed repeatedly with permanent cures.

Dr. Bloodgood (closing the discussion).—There is not time to answer all of the questions that have been brought out in the discussion, but I think I have answered most of them in my article published in the *Archives of Surgery*. I think almost every question that has been asked here will be found in the chapter on the Pathology of Chronic Cystic Mastitis of November 21.

I should like to say a few words in reference to Dr. Trout's interesting case. I feel that his communication on the danger of cancer taking place in the remaining breast if pregnancy takes place is original and very important.

Dr. Kilgore in going over the material of the Johns Hopkins and the University of California, and making his report to the American Medical Association, states that the incidence of cancer of the breast in patients who remained well four

years after operation ran the risk of 10 per cent of cancer. You can draw your own conclusions. I am beginning to feel and to advise the removal of the other breast if one breast is found cancerous. Dr. Trout has demonstrated that if the woman is still young and has a chance of pregnancy the danger is greater. I should think it far safer to remove the breast than if she wanted to have children. We have one patient in whom both breasts were removed for cancer; she married afterward and has five children and is living fourteen years after that operation. At the present time there is only one case living of cancer in which cancer was present during pregnancy. I think I ought to emphasize the point here that when I was speaking about lumps in the breast and of not operating on them I did not mean definite lumps, I meant indefinite lumps. I agree with all of you and with Dr. Finney that if a woman has a definite lump in the breast and is over twenty-five it should be operated on at once. I cannot conceive of any reason for any delay. She should be operated on the next day if possible. Of course, she should have a proper examination.

I have tried to bring to your attention, and you apparently all agree with me, that it is no longer surgery which is going to increase our cures of cancer of the breast and decrease the mutilating operations for benign tumors. If we find by our tactile sensation that a woman has a tumor of the breast an operation should be done as speedily as possible whether it is benign or malignant.

In answer to Dr. Finney's question relative to mistakes, the point I tried to make in this paper was that a mistake that should not be made is the incomplete operation for cancer. The majority of surgeons in this country when they explore a lump in the breast recognize cancer at once. Personally, you do not need a microscope to recognize cancer.

Dr. Finney spoke about the frozen section. He does not need it. He does not make that mistake. He does not send lumps removed that are cancer. As far as my record shows he has only done it once in a lifetime, and that was a cyst. That is the only case against him in the laboratory, and there have been only four cases at the Johns Hopkins where that mistake was made in thirty years, where an incomplete operation for cancer was done and three of them were cysts. That was done before 1900, and a resident surgeon of the Johns

Hopkins Hospital in the last five or six years made the fourth mistake of doing an incomplete operation for a bloody discharge from the nipple.

There are two types of cancer of the breast from the standpoint of the gross picture. One is the circumscribed cancer which is never encapsulated. We leave out the cyst. Remember that cancer of the breast is never encapsulated. I will offer a prize for one provided he will let me have ten or twelve pathologists. I will not give the prize on the examination of one pathologist. Cancer of the breast is circumscribed; it is infiltrated. I am passing around scirrhus, and whether it is as small as a pea or much larger it looks alike. If one needs a microscope to diagnosticate cancer he wants to change his profession.

Here is one of the most minute cancers of the breast we have had. We knew it was cancer because it is pulled under the nipple and skin; but supposing it had not, and we cut down upon it, we could see a little bit of cancer in the breast.

There is no necessity of making any classification of cancers of the breast or anywhere else. Cancer of the breast is either circumscribed or infiltrated.

The two common benign tumors of the breast are the cysts. I have been calling them blue-dome cysts, and I believe if one cuts down upon such a cyst slowly enough he will find it an adenoma. We do not care what kind of adenoma it is it is encapsulated. If one cuts down upon a tumor and it is a blue-dome cyst or encapsulated tumor he should remove the tumor. If it is not then do the cancer operation. If one waits for a frozen section he will mutilate more breasts for benign tumors and he will not recognize any more cancer. There is a group of tumors that are not blue-dome cysts and encapsulated and are not cancer. Those are the ones you gradually learn to recognize, but the total number of these cases is relatively small, and if they were all treated for cancer the total number of women mutilated would be relatively small. I am confident if one will look at the tumors as he cuts down upon them and look at them again in the formalin and study them he will recognize this group I have described in this article and the second article is almost ready. A mistake that is made and will be made is the complete operation for cancer when it is not cancer. We were running in the Johns Hopkins Clinic 10 per cent mistakes of that type, and following the educational

propaganda of cancer the percentage went up 25 in our own clinic. Finney and myself and all of us are in that group. Women came to us early with these border-line cases; they were not blue-dome cysts and nonencapsulated adenoma, and yet they were not cancer, and we did not know what they were. As a rule we did not think they were cancer but operated for cancer. This percentage has come down to 15 in the last year. It seems to me that is putting it very fairly.

In palpating the breast if one finds a patient has a definite lump cut down on it. I believe it is safer. There is no objection to making a frozen section, but I am confident if one makes a frozen section he will mutilate more breasts. The growth is generally sufficient to indicate to you what to do.

I have made the statement that when a cancer has been cut out and the wound closed and later operation for cancer performed the probabilities of a cure were reduced from 35 to less than 10 per cent. That is no longer necessary, and the remarkable thing is that no longer does any surgeon who sends anything to my laboratory, send me a lump of the breast and I have to telegraph him back; but frequently surgeons are sending complete breasts that are not cancer. However, that mistake is made very seldom now. That mistake is made more often by the surgeon who has a frozen section than the surgeon who does not have a frozen section, because the very best pathologists disagree as to what is cancer. There are two sections here that I referred to pathologists which I felt certain were cancer. One of them was operated on for cancer, but it never occurred to the surgeon that it was not cancer. That patient is dead. Another case Dr. Halstead explored in 1895. It never occurred to him it was not cancer; he did the complete operation for cancer. One of these patients is dead. Both are cancer. Of these two sections there had not been a single disagreement among sixty pathologists. If one submits to pathologists sections of cancer, scirrhus and mammary cancer there will be no disagreement. Submit to them sections of chronic cystic mastitis, sections of the breast around a blue-dome cyst, sections of the wall of a simple abscess during lactation, which everybody knows is an abscess, sections of encapsulated adenoma, they will differ as to whether they are cancer or not. These are the facts. The point is this: There is a border-line group. This is not a clear, good picture of an adenoma or a clean-cut picture of a normal breast

like that (indicating). All will agree that is a normal breast. Some will tell you that it is an adenocarcinoma. Every patient will die of cancer of the breast if one calls that cancer. Others will tell you that this is an intracanalicular myxedema. From now on there is every diagnosis made from benign to malignant. A remarkable thing is that pathologists who have had the largest experience and the longest experience disagree with regard to such material as I have shown you. Dr. Waite, of St. Luke's, Dr. Ewing and myself have agreed more on these sections than any other group of pathologists.

Lastly, I only want to leave this impression with you: I may have seemingly spoken to you very dogmatically on this subject, but I do not feel dogmatic about it. It is unnecessary for me to emphasize the point that you are beginning to feel the difficulty of diagnosis in breast tumors.

Dr. Long.—There is one question you have not touched on which bears on some of the discussions that have followed. Is there any way to recognize a precancerous stage in the so-called Paget's type of cancer? You said a while ago they were all fatal. Can you recognize it before it gets that far?

Dr. Bloodgood.—Take an ulcer; if soap and water does not heal it up it may be cancer, but many of them are not cancer.

PELVIC TUMORS WITH SACRAL ATTACHMENTS

By Arthur A. Law, M.D.
Minneapolis, Minn.

Pelvic tumors with sacral attachments, or "Ventral Tumors of the Sacrum," as we designated them in a paper read before the Western Surgical Association in 1912, are so rare that a careful study of the literature has shown but 30 of these cases reported. This includes the 2 cases here reported.

When we study the embryology of the sacrococcygeal region we appreciate why certain tumors whose occurrence is rare in other locations may readily be found here, tumors which exhibit one or all of the three primary germinal layers. We learn that very early in the life of the embryo the caudal intestine, the canal dorsalis, the chordæ dorsales, primitive streak, medullary tube and vestiges are formed in the caudal end of the spinal axis by the entoderm, mesoderm and ectoderm. We find as well that the central canal of the spinal cord and the primitive alimentary canal are in communication around the notochord as the neurenteric canal. When the proctodeum invaginates and finally forms an opening into the primitive gut, this opening occurs anterior to the neurenteric canal; there is left, therefore, a small portion of the gut between the newly formed anus and the neurenteric canal, the so-called "postanal gut"; this hind gut and the communicating neurenteric canal

finally become obliterated and are then designated as "obsolete canals."

An understanding of the embryology of this complex region lucidly explains the multiple types of tissue which enter into fetal vestiges remaining ventral to the sacrum, and the wonder is, not that tumors are found here so rarely, but rather that they are not of much more frequent occurrence.

These tumors ventral to the sacrum exhibit such a great variety of tissues, which are sometimes hard to differentiate, that they come under the classification of dermoids, mixed tumors, or the teratomata; in addition to these we must add the very rare chordoma, arising from the anlage of the notochord, for 6 cases of this type of tumor have been reported attached to and in front of the sacrum.

Uncertainty as to the etiology of these tumors is responsible for the many theories advanced by various observers who have attempted to explain their origin. A few of these theories merit brief consideration:

The Marchand-Bonnet theory has accorded a genetic equality to all composite dermoids, embryos and parasites.

Borst asserts that disturbances in the caudal region may make it possible for portions of the vestiges coccygiens to be transplanted to the ventral side of the sacrum and there give rise to the tumors.

Middledorpf, Ritsch and Masse believed these tumors arose from local disturbances of development of misplaced tissue anlage of the postanal gut, medullary canal and neurenteric canal, in conjunction with ectodermal and mesodermal inclusions.

Virchow, Ahlfeld and Henning found it difficult to accept the monogerminal theory as explanation of the complex teratomata where were found fragments of organs, bone or fetal limbs. This skepticism gave rise to the bigerminal theory, which postulates that these tumors represent an

incomplete monstrosity or twin, a parasite engrafted upon its host, a so-called suppressed fetus.

Another theory advanced, although not generally accepted, is that the tumors with their three embryonic layers are originated by a blastomere or impregnated pole-cell which has been cast out of the complex.

Adami has advanced an ingenious theory, derived from his observations on the growing points of plants, where in the root and stalk the cells of the growing points are projected and crowded apart by the division of the daughter cells between them. In the mammal he believes these growing points are located at the base of the brain, near the pituitary body, and in the region of the sacrum. He affirms that with the complete development of the nervous system further development of the growing points is arrested. If then, through some exciting agent, the growth continues after the mammal has reached maturity, he believes the cells have the peculiar property of reproducing the three primary germinal layers. This theory, Adami claims, will explain the etiology of the teratomata and mixed tumors which occur at the base of the skull and in the sacral region.

These pelvic tumors ventral to the sacrum vary markedly in their morphology, ranging from the simpler inclusion dermoids, showing but one germinal layer, to tumors representing nearly all types of tissue; in some of them the tissues are difficult or impossible of differentiation, while in others a preponderance of one type of tissue identifies them, as instanced by the notochord tumors with the typical vacuolized cells suspended in a gelatinous matrix, or in the very rare tumors where ganglionic cells or neuraxones have been demonstrated and uphold the theory of neurenteric canal origin.

Most of the tumors under discussion have been reported to be definitely encapsulated and were readily shelled off from the sacrum. They have been confused with all of the pelvic neoplasms, including fibroid tumors of the uterus,

ovarian cysts, tubal and abdominal pregnancies, abscesses, intraligamentous cysts, anterior spina bifida and hypertrophied prostate.

They have generally been considered benign, yet Parin collected 6 cases which proved to be malignant, and Pringle, Fowler and Lund report local recurrence and metastasis. Both of my cases died of recurrence. Eighty per cent of the chordomas have been reported to be malignant.

These tumors are rarely recognized until they encroach upon neighboring organs—the uterus, bowel or bladder exhibiting symptoms of pressure or obstruction.

While they are easily palpated by rectum or vagina, their differentiation is sometimes very difficult. This explains the attempts to remove them by the abdominal route, a difficult and dangerous method owing to their inaccessibility and the difficulty of controlling hemorrhage.

We believe that, owing to the demonstrated tendency to malignant degeneration, these tumors should be removed when recognized, and we are convinced that they should always be attacked from behind through the sacrococcygeal route. The modified Kraske approach is ideal for the larger tumors and permits them to be shelled out with little difficulty, usually without invading the peritoneum, and facilitates the control of hemorrhage.

Because of the rareness of this tumor, and because the histological structures vary so markedly, we are constrained to report 2 cases which have occurred in our experience. The first case was reported in 1912, therefore will be briefly abstracted.

Case I.—Miss M. B., aged sixteen years, pregnant and at full term; was in active labor for twenty-four hours; there had been no enagagement of the head. Bimanual examination revealed a pelvic tumor which was thought to be a fibroid in the posterior cervical lip. This growth prevented delivery *per vaginam*. On August 28, 1912, a

Cesarean section was done and the child delivered. Through the abdominal incision we were enabled to determine that this tumor was attached to the sacrum and could not be removed by this abdominal route.

On October 2, 1912, as this woman was cachectic and had a low hemoglobin, and as the tumor was rapidly increasing in size, she was subjected to an exploration. The exposure was made through the sacrum by a typical Kraske incision. The tumor was found to be retroperitoneal, with a small attachment to the sacral periosteum and crowding the vagina and rectum. It was removed with little difficulty. The patient was discharged from the hospital five weeks later.

Dr. H. H. Robertson, now professor of pathology in the Mayo Clinic, in a careful study of this unusual tumor, reported it at length. The tumor was 9 cm. in length and 6 cm. in diameter, and definitely encapsulated. There was a smaller tumor 3.5 cm. in diameter attached to the main tumor. In the study of these tumors Dr. Robertson's conclusions were as follows:

"The large tumor shows a loose, rapidly growing connective-tissue stroma, in which are nests of embryonic cells growing in syncytial-like masses and suggesting malignancy in their manner of growth and appearance. Areas of hemorrhage, necrosis, and calcareous degeneration demonstrate the atypical character of the tissue, its rapid development and imperfect blood supply. The smaller tumor suggests a neuroma in its general character, although neuroglia fibrils have not been demonstrated.

"That the tumor springs from some misplaced remnants of the terminal portions of the neural tube seems a logical conclusion. That portions of it have developed abnormal powers of proliferation and shown signs of malignant change, while other portions have in an imperfect manner reproduced the adult type of nerve tissue, is apparently the only explanation which accounts for these rather widely diversified tumor masses."

It is interesting to note Dr. Robertson's original observation as to the malignant characteristics of the tumor. This patient died a year later, in the country, from a local recurrence. The tumor masses, removed by the local physician and sent to the University of Minnesota for examination, reveal the following:

"Microscopically the tumor is composed of small irregular masses and cords of cells separated by a large amount of loose fibrous stroma in which there is a considerable amount of diffuse hemorrhage. The cords are composed of deeply stained nuclei embedded in a common cytoplasmic mass—that is, there is rarely a definitely outlined cell body. No nerve cells such as occurred in the primary tumor can be identified. Diagnosis: Recurrence of malignant neuroblastoma."

CASE II.—E. T., male, aged twenty-seven years. The difficulty was first noted four months ago when the patient noticed pain in the rectal region and some degree of constipation. No blood was passed by rectum and he had no hemorrhoids. He found some slight difficulty in urinating. There was no loss of weight. He was told by his local doctor that he had a *fissure in ano.*

Examination, March 5, 1921: Well-nourished man with no abnormality other than the local condition. Rectal examination revealed a hard, smooth, rounded mass almost completely filling the true pelvis. The mass was not tender and could not be differentiated from the prostate. The bladder was readily catheterized.

Roentgen ray examination shows a normal sacrum and coccyx. Roentgen ray of the bladder filled with sodium bromide solution revealed this viscus pushed upward out of the true pelvis and lying in close apposition to the anterior abdominal wall. No irregularity in the contour of the bladder could be demonstrated by the roentgen rays.

Under gas anesthesia this mass was explored with a hollow needle but with a resultant "dry tap."

Clinical diagnosis: Ventral tumor of the sacrum.

Operation, March 9, 1921, at the Northwestern Hospital: Under gas and ether anesthesia the mass was approached by a modified Kraske incision, removing the coccyx and the sacrum below the third foramina. The mass was found definitely encapsulated, the capsule being roughly about one-fourth of an inch in thickness. The tumor was attached to the hollow of the sacrum. The prostate gland was not seen or felt during the operation. The gut lay anterior and to the left of the mass. The whole mass was entirely extraperitoneal and was shelled out with relatively little hemorrhage. This tumor was $8\frac{1}{2}$ cm. wide and 10 cm. long.

This man had a prompt local recurrence and died three months later, on June 5, 1921, at which time his pelvis was completely filled with the tumor mass. It was impossible to get a complete postmortem, so portions of the tumor were removed from the pelvis. The report of the primary tumor and of the recurrence by Dr. E. T. Bell, professor of pathology, University of Minnesota Medical School, is as follows:

"Microscopically the structure of this tumor varies notably in different portions. The most common appearance is a network of thick anastomosing cords of cells which are separated by a small amount of dense fibrous connective tissue. The cords are composed of closely packed, slightly vesicular nuclei, embedded in a common mass of cytoplasm without the formation of any definite cells. There is no differentiation into any recognizable tissue. The appearance of the tissue suggests an epithelial character.

"Other areas of the tumor show much more abundant connective tissue with a corresponding diminution in size of the epithelial cords. In some places the cords are broken up into small masses separated by large amounts of connective tissue. The structure of the cords of cells is everywhere, however, the same.

"One small portion on the margin of the tumor shows definite prostatic tissue. The surgeon does not report the tumor as attached to the prostate. The prostate tissue is encapsulated. The presence of this tissue suggests the possibility of the tumor having its origin from the prostate gland. If this interpretation be correct, we are dealing with a malignant prostatic tumor, apparently of epithelial nature.

"The recurrence shows a structure similar to that of the original tumor except that no prostatic tissues are found."

The interesting feature of this tumor is that there is only one tissue in it which can be definitely differentiated, and this tissue is prostatic tissue. This tissue suggests the interesting possibility that this tumor may represent an embryoma bearing the same relation to the prostate as do some of these tumors of the testicle to that organ, and that it might possibly be classed as a teratoma of the prostate in which development was one-sided. We are, however, unable to find any references in the literature which substantiate such an assumption.

Inasmuch as it has been impossible definitely to differentiate this tumor, it is not important by what name we designate it, so long as we recognize that we are dealing with an embryoma of malignant tendencies. Therefore, the writer has stressed the importance of the removal of these embryonic tumors ventral to the sacrum, as he believes that most of them tend to malignant degeneration.

References

Campbell: Am. Jour. Surg., 1909, xxiii, 207.
Pringle: Lancet, London., 1907, i, 1021.
Massey: Am. Med., 1904, viii, 360.
Keen and Coplin: Surg., Gyn. and Obst., 1906, iii, 668.
Frank: Jour. Am. Med. Assn., 1906, xlvi.
Markoe and Schley: Am. Jour. Med. Sc., cxxiii, 820.
Gross: System Surg., 1882, ii.

Bernacki: Dissert., Berlin, 1887.
Sanger: Arch. f. Gynäk., 1890.
Birketto: Guy's Hosp. Repts., 1859.
Schwinn: West Va. Med. Jour., v, 122.
Brennan and Choquette: Rev. méd. du Canada, January 22, 1912.
Leopold: N. Y. Med. Jour., 1906, 479.
Davis: Jour. Am. Med. Assn., 1910, liv, 1288.
Middledorpf: Virchows Arch., ci, 37.
Nieberding: München. med. Wchnschr., 1904, ii, 1384.
Mallory: Am. Jour. Med. Sc., 1882, new series, ciii, 263.
Trinci: Rev. d'Orthop., Paris, July, 1911.
Kurzwelln: Deutsche med. Wchnschr., 1908, xxxiv, 1748.
Teschen: Arch. f. klin. Chir., lxxxvii, 1.
Keller: Arch. f. Gynäk., lxxxv, 3.
Powers: Med. News, N. Y., lxxix, 641.
Stopler: Deutsche Ztschr. f. Chir., 1.
Masse: Zentralbl. f. klin. Med., lxx, 1077.
Heinzmann: München. med. Wchnschr., December, 1909.
Wood: Ann. Surg., Philadelphia, 1911, liv, 284.
Mallory: Jour. Med. Research, 1905, xiii, 113.
Delafield and Prudden: 9th ed., 1911, 359.
Borst: Die Lehre von innerlichen Geschwülste, Wiesbaden, 1902.
Martina: Deutsche Ztschr. f. Chir., lxxx, 1905.
Bland-Sutton: Keen's Surgery, i, 823.
Skutch: Ztschr. f. Geburtsh. u. Gynäk., xi, 3530.
Johnson: Surg. Diag., vol. m., 103.
Albert, H.: Surg., Gyn. and Obst., 1915, xxi, 766.
Parin, W.: Deutsche Ztschr. f. Chir., Leipzic, August, cxxiii, No. 5–6.
Lund, F. B.: Boston Med. and Surg. Jour., July, 1919, clxxxi, 704.
Stabey, J. C.: Minn. Med., 1921, iv, 429.
Pearse, Herman E.: Surg., Gyn. and Obst. August, 1921, xxxiii, 164.
Adami and McCrae: A Text-book of Pathology, 2d ed., 1914, 815

DISCUSSION

Dr. John E. Cannaday, Charleston, W. Va.—These tumors are rather uncommon and I should like to report a somewhat similar case that I have had in my practice. I saw the case about eight years ago. The tumor occurred in a young woman. It was quite advanced and extensive, and when I saw her it had pushed through the foramen and caused great pain along the course of the sciatic nerve. It was so large that the patient was unable to void urine and had to be catheterized. I

attacked this tumor from several different points, doing a two-stage operation, removing a portion of it from the sciatic foramen. I then went into the abdomen and made an incision through the parietal peritoneum in the V-shaped space between the great pelvic vessels and enucleated several large masses weighing, as I remember, five or six pounds. At the second half of the two-stage operation I did a modified Kraske and removed the balance of the tumor from the hollow of the sacrum. This patient got along fairly well for two years. She later went to the Pacific Coast, had a considerable recurrence and was operated on by a surgeon in Los Angeles whose name I have forgotten. She later on had another recurrence. I have lost track of the patient and do not know the final outcome of the case. Undoubtedly it has gone on to malignant degeneration. The tumor specimen was studied by a local pathologist and by a pathologist connected with the University of Los Angeles, and the two came to the same conclusion that the tumor was of the same nature as the one described.

Dr. V. P. Blair, St. Louis, Mo.—I removed two of these tumors a long time ago; one from a newborn infant two or three hours old and the other from a young woman who had had the tumor for a number of years. In the latter the tumor had become infected and had half a dozen fistulæ discharging pus; she looked as though she was in the last stages of emaciation from sepsis. The tumor was probably ten inches long and a foot across, protruding between the rectum and the coccyx. A transverse incision was made and I think in ten minutes the tumor was stripped out. I was feeling quite elated until the anesthetist punched me with her elbow and I looked at the patient and saw that she was in shock and beyond recovery. It occurred just like that (snapping the finger), and I have thought since that if I should ever have to take out one of these tumors again I would do it under spinal anesthesia to block shock, just as we do hip-joint amputations.

A SKIN SUTURE WITHOUT A FAULT

By Edward H. Ochsner, M.D.
Chicago, Ill.

For over fifteen years I made diligent search for a perfect skin-suture material. In my efforts to find such a suture I tried out clinically every suture that I was able to procure on the market, but each had two or more serious defects. I then started out preparing and trying materials that had not previously been used for this purpose, but with no better result. Finally I submitted the whole matter to my friend, Prof. L. Kahlenberg, professor of chemistry at the University of Wisconsin, and after about six months of chemical experimentation on his part and clinical trial on my part we perfected a material which I believe will fill the most exacting requirements.

A perfect skin-suture material must possess the following qualities:

1. It must be relatively fine in proportion to its strength.
2. It must be of uniform strength throughout and have no weak spots.
3. It must be sufficiently strong for the purpose in hand.
4. It must be of uniform thickness.
5. It must be smooth.
6. It must be pliable.
7. It must be impervious to the body fluids physically, *i. e.*, have no seton action.
8. It must be unattackable by the body fluids chemically.
9. It must be impenetrable to leukocytes.

10. It must be nonirritating to the tissues.
11. It must be sterilizable by boiling in plain water.
12. It must be easily stored.
13. It must be of determinable length.
14. It must not deteriorate with age.
15. It must not snarl.
16. It must not be too expensive.

The skin-suture material which I present for your inspection fulfils all of these requirements and I believe is a skin suture without a fault. The No. 1 is suitable for superficial coaptation stitches. Nos. 2 and 3 are suitable for deep tension and subcuticular stitches.

DISCUSSION

Dr. Ernest Jonas, St. Louis, Mo.—I have been using this suture material for nine months and have found it very satisfactory in every way. The fine material answers the purpose of horsehair but is much stronger. The coarser material is used like silkworm gut. The removal of the gross suture material is much more pleasant than silk or silkworm gut.

Dr. A. J. Buist, Charleston, S. C.—I have used some of this suture material Dr. Ochsner has described, and I received a circular saying it was endorsed by him. This was about six months ago. Since then I have been using it and have been very much pleased with it. I have used nothing but this as a skin suture. I can heartily endorse all that Dr. Ochsner has said. I use it as a subcuticular suture and as a through-and-through suture and find it all that Dr. Ochsner has represented it to be.

Dr. Stuart McGuire, Richmond, Va.—I have used this suture material with the greatest satisfaction.

Dr. Ochsner (closing the discussion).—I sent Dr. Stuart McGuire some of this suture material about a year ago. He told me the other day that there is not a piece of silkworm gut

or horsehair to be found in his hospital, and I consider this endorsement one of the finest possible.

I will simply say this in addition that for wiring fractured jaws it is one of the finest things I have ever tried. Only recently I had a patient who was badly battered up with a double fracture of the jaws. I tied the teeth together with No. 2 and have never had a patient with a fracture of the jaw with so little discomfort. He hardly knew he had anything in his mouth. It held the fractured ends together splendidly, and that with the minimum of discomfort.

TOTAL TRANSPOSITION OF VISCERA

By Henry H. Sherk, M.D.
Pasadena, Calif.

As an anatomical curiosity *situs viscerum transposus* has always been of considerable interest to the anatomist and embryologist and instances of this abnormality have been observed and recorded since the time of Aristotle. To the clinician its recognition has more practical significance and is of extreme importance from the standpoint of differential diagnosis.

Until[1] recent years most of the recorded cases had been found on the disecting or postmortem table. Now, however, the reverse is true and the majority are recognized during life by the clinician. The roentgen ray and the present-day thorough and systematic routine examination are responsible for this.

Aristotle's[2] writings show that he had observed two instances of transposed organs in animals.

Petrius Servius,[3] in 1615, recorded the first recognized human case as occurring in Rome, but Carl Beck[4] states that the earliest authentic case was reported in the time of Molière, in the person of Marie de Medici, Queen of France.

Kuchenmeister,[2] was the first to recognize the condition during life, based on examination by percussion and auscultation.

According to Sorge[1] the first roentgen ray record of this condition was made by Vehemeyer in 1897.

In 1865, Grüber[5] collected 79 cases from the literature, only 5 of which had been recognized during life.

Kuchenmeister,[5] in 1888, collected 149 cases. By 1895, Pic[5] was able to collect 190 reported cases, and in 1902 Arneil added, including his own, 44 more, 38 of which were recognized during life.

Karashima,[2] in 1912, catalogued over 200 cases, and gave what is probably the best historical *résumé*.

From the literature at my command I have been able to find 24 cases reported since 1912, and have received verbal reports of 3 unpublished cases (J. M. King, S. J. Mattison and H. A. Royster).

These figures cannot be accepted as accurate or complete, for this anomaly has been reported under so many different titles, and individual cases so often duplicated in the published articles, that it is very difficult to sift them out.

Only two writers[6 7] have mentioned observing this condition in recruits during the late war. It would be interesting to have the figures of the findings, in this regard, of our draft and army examining boards.

A communication from the Mayo Clinic states that a hurried search of their records shows 10 cases indexed since 1910. For the same period their registration was approximately 347,000.

By transposition of a viscus (*situs viscerum inversus* or *transversus*) is meant, not only that the organ is situated on the side of the body opposite to its normal location, but that it is also reversed as to its actual structural relationship, presenting, in comparison to the normal, as if seen in a mirror. For example, in transposition of the stomach the pylorus lies to the left and the cardia to the right, or, in transposition of the heart, the relative position of the auricles, ventricles and vessels is reversed.

When the viscus is not reversed in its abnormal location it is simply a displaced organ or in a condition of *situs perversus*. Of course, an acquired *dextra cardia* is never a true transposition of the organ.

Transposition of the viscera may be total or partial.

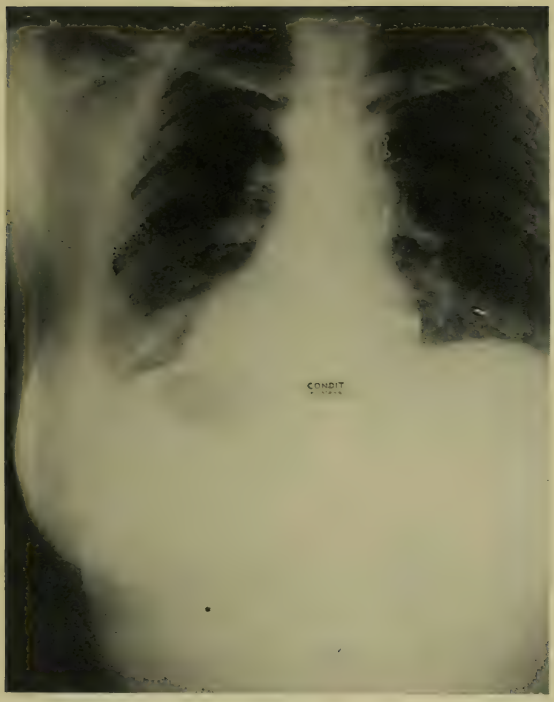


FIG. 1.—Roentgenogram of chest in author's case.

FIG. 2.—Roentgenogram of abdomen in author's case.

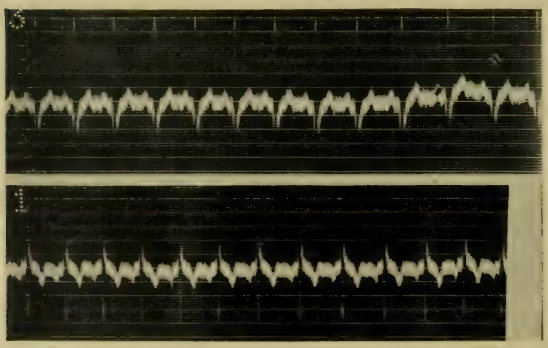


FIG. 3.—Graph showing normal curve at top, 3, reversion curve, in author's case, 1, at bottom.

The former is by far the more common. The latter is very infrequent. This is especially so of true congenital *dextra cardia*, as an isolated condition, of which Schrotter[8] says, "None, not combined with transposition of other viscera, have actually been confirmed by autopsy." Contra to Schrotter's statement, Kriezer,[8] in 1880, collected 14 reported instances of isolated congenital *dextra cardia*. Of these 14, however, only 5 were proven by postmortem examination.

Total transposition of viscera is apparently twice as common in men as it is in women,[5] and when occurring in women it has no effect on their childbearing ability.[9]

Statistics on which to base the incidence of heredity could not be found in the literature, no cases having been recorded in which the condition occurred in parent and child. Brimblecombe[10] reports one instance of 2 cases in the same fmily, brother and sister.

Many theories as to the determining factor in the causation of this condition have been advanced, but none have been substantiated.[5 11 12]

The most plausible explanation[3] is the one that ascribes it to the changed position of the primary cardiac tube in early embryonal life, a reversal of its direction from a normal "S" to the reversed "S". This change[8] of position is probably caused by the reversal of the direction of the blood current, which occurs if the usual relationship of the embryo to the primitive chorion is altered so that its right instead of its left side is placed nearest its blood supply.

Von Baer[5] ascribes it to the changed relations of the embryo and the umbilical vesicle. Normally it lies on the left side of the vesicle, but if it lies on the right side transposition of the viscera occurs.

Rindfleisch[5] believes that a reversal of the spiral turning of the blood column is the causative factor.

Virchow[5] emphasizes the influence of the umbilical cord. In *situs transposus* it is wound spirally to the right, like a

right-handed screw, the reverse of the normal, which is to the left. This fact, if true, is of real practical importance.

Adami[12] quotes the monochorial twin theory, but puts little faith in it.

In his article,[5] Arneil takes up most fully the many theories that have been put forward by various writers.

A reversal of all of the ordinary physical signs occurs in total transposition of the viscera. The positions of the apex beat, the cardiac dulness and valvular sounds, the liver dulness and the stomach tympany are all transposed and reversed. Also, in the male, the right testicle, in the majority of instances, hangs lower in the scrotum than does the left. The reversed spiral twist in the umbilical cord may be present when the newborn infant is the subject of transposed viscera.[5]

The roentgen-ray findings simply show a picture as if the photographic plate taken of a normal individual were reversed.

Theoretically the speech center in the brain should be transposed.[12 13] This is of special interest to the neurologist and the neurosurgeon, insofar as it influences differential diagnosis. Correspondingly the subject should be left-handed, but this is an inconstant finding.

Electrocardiographic tracings sometimes show inverted waves,[14 3] but this also is not constant.

The transposed organs develop normally,[3] and their abnormal position apparently has no effect upon their functioning or upon the general well-being of the subject of total transposition. They are normally able to undergo exertion without distress or undue fatigue and are not more than ordinarily susceptible to disease.[15] On the other hand, the subject of partial transposition is generally deficient in stamina and suffers distress upon slight exertion.[15]

Recognition of the abnormality is generally easy except when associated with some pathological condition which might account for an acquired malposition of an organ.

It is surprising how many of the reported cases of transposition of the viscera remained unrecognized until the abnormality was disclosed at operation or autopsy.

Virchow[4] found transposed viscera, postmortem, in a case where, in spite of the observation of reversed ordinary physical signs, the clinician had stated that on auscultation the heart sounds were "heard with difficulty on account of the presence of bronchitis" and that the "spleen was very much enlarged."

One reported case had been examined five times for life insurance without the condition of transposed viscera being recognized.[5]

Lane[6] reports a case of a soldier who had previously been examined several times and his abnormal condition passed unrecognized.

From a diagnostic standpoint the knowledge of the existence of a condition of *situs viscerum transposus* is of extreme importance in the presence of most of the inflammatory diseases and injuries of the chest and abdomen. In some its recognition is essential to a correct differentiation. It is unnecessary to enumerate the many pathological conditions in which this has a bearing. It is also unncessary to emphasize the great importance of making a complete and thorough physical examination, with the possibility of this anomaly in mind, as a routine procedure in every case.

In newborn infants an umbilical cord with reversed twist should always suggest to the obstetrician the possibility of an associated visceral transposition. How seldom this is observed, and how few babies are given more than a casual glance to see if there is any gross external malformation, is only too well known.

Every individual in whom transposed viscera are observed should be fully advised as to the abnormality, and be instructed in case of illness or accident to so inform the attending physician. This precaution may prevent an

unnecessary operation or at least obviate inconvenient or duplicated incisions.

My own case, seen recently, is as follows:

Miss M. A., Norwegian servant-girl, aged twenty-seven years, height 5 feet 6½ inches, weight 166 pounds net, consulted me October 14, 1921, on account of a gradually increasing amenorrhea. Family history negative. Mother died of kidney disease. The patient was a large, hearty, bright-complexioned girl, who said she had had no illness since childhood except an attack of influenza about two years ago. Her menses began at thirteen, irregular at first, twenty-eight day type, and last three to four days. She had little pain, which when present always occurred at the start. The flow was never free. She is not of nervous type. Does not overwork. Has no past sexual history; at least none could be elicited. Said her menses for past year had become less and less. Her last period had ceased two days previously. It had lasted less than two days and the flow had not been more than a show. I examined her chest as a matter of routine and, in view of a possible pregnancy, to allow inspection of the breasts without drawing attention to them. The breasts were well-developed but negative. Auscultation of the usual heart area elicited rather faint heart sounds, though not more faint than often heard over normally located hearts. No apex impulse could be felt. On listening over the right chest the sounds were heard, loud and distinct, in the reversed position. The apex beat could be felt in the right nipple line, exactly opposite to the normal position on the left. Percussion of the upper abdomen and lower chest showed tympany on the right and dulness on the left, the latter corresponding in size and outline to the ordinary liver dulness. There was no abdominal tenderness. The spleen and kidneys were not palpable. The external genitals were well developed and symmetrical. The introitus admitted two fingers

freely. The cervix was small, hard, and conical and pointed downward. The fundus was not definitely palpable, owing to the firm, rigid abdominal muscles, but the uterus certainly was not enlarged and was apparently retroverted. Nothing was discovered to suggest pregnancy. A second examination, made one month later, demonstrated an undersized, sharply anteflexed uterus with the body small in proportion to the cervix. The adnexa were not palpable.

The chest findings were corroborated by my colleague, Dr. J. D. Condit, who also made roentgenograms of the chest and abdomen. His report of the roentgen-ray findings are as follows:

October 17, 1921. No. 3890. *Chest Film.* Shows the heart with the apex on the right side, 3½ inches from the median line at a distance of 36 inches. The heart shadow is perfectly normal in size and shape, but reversed. The curve of the aorta comes at the normal relation, but to the right of the spine. The diaphragm shadow on the right side is lower than on the left and shows the gas bubble in the upper pole of the stomach on the right. The relative height of the two sides of the diaphragm are normal. The chest is otherwise negative, except for a moderately normal amount of hilus thickening.

October 18. No. 3894. *Abdominal Film.* Barium meal and enema given simultaneously. The enema entered a normally placed rectum, passed through a small sigmoid up the right side of the abdomen. The splenic flexure is placed on the right. The transverse colon passes across level with the second lumbar vertebra to a hepatic flexure normally related but on the left side. The appendix did not fill. The ileocecal valve is competent. The stomach is seen horizontally placed in the uppermost part of the abdomen, normal in size but transposed.

The entire contents of the chest and abdomen appear in the films as absolutely normal in size, shape and relationship except for their transposition.

Electrocardiograms were taken by Dr. A. S. Granger, whose report is here given.

There is a complete reversion of all the waves in Lead 1, which is typical of a complete transposition of the heart and only seen in that condition. Leads 2 and 3 replace each other, but no reversion of waves is seen. The mechanism of this is as follows:

Lead 1 is a symmetric one from the right arm to the left arm. A lead taken from the left arm to the right arm in a normal subject produces an inverted picture, consequently the left arm stands to the normal subject as does the right to the subject of transposition.

A lead from the right arm to the left leg (Lead 2) in a normal subject is almost equivalent to a lead from the left arm to the left leg in the subject of transposition (Lead 3). So in the latter, Leads 2 and 3 replace each other, but neither shows reversion of the waves.

Besides the above characteristics the cardiograms are entirely normal and very typically show the condition of *dextracardia* present.

It is interesting to note that this patient had never been conscious, as some of these subjects are, of the heart sensations on the right side, and although examined physically several times when she had the influenza and once or twice at previous dates the transposed positions of her organs had never been recognized. She is right-handed and there is no asymmetry of figure, spine, face, eyes, nose, throat or neck.

Summary. 1. Total transposition of viscera is not so very infrequent.

2. Its standing has changed from that of an anatomical curiosity to a matter of clinical interest and importance.

3. It has no effect on the health of the individual.

4. Its recognition is extremely important in certain surgical emergencies.

Bibliography

1. Jacobson: Am. Jour. Obst., 1917, lxxvi, 953.
2. Lineback: Jour. Am. Med. Assn., 1920, lxxv, 1775.
3. Hirschfelder: Diseases of Heart and Aorta, 3d edition, 560.
4. Beck: Ann. Surg., 1899, xxix, 593.
5. Arneil: Am. Jour. Med. Sci., 1902, cxxiv, 885.
6. Lane: Boston Med. and Surg. Jour., 1919, clxxxi, 641.
7. Parsons-Smith: Lancet, London, 1919, cxcvii, 1076.
8. Abbott: Modern Med., Osler, 1908, viii, 344.
9. Hartz: Med. Record, 1916, xl, 1027.
10. Brimblecombe: British Med. Jour., 1920, p. 889.
11. Willius: Am. Jour. Med. Sci., 1919, clvii, 485.
12. Adami: Principles of Pathology, 2d edition, 1910, i, 277.
13. Bell and Winn: Medical Journal of Australia, April, 1920.
14. Owen: Heart, 1911, iii, 113.
15. Meyers: Proc. Roy. Soc. Med., London, 1921, xiv, 5.
16. Aich: Indiana Med. Jour., 1919, liv, 380.
17. Aich: Ibid., 1920, lv, 59.
18. Toy and Ellis: Jour. Am. Med. Assn., 1920, lxxiv, 322.
19. Billings: Phila. Med. Jour., 1900, vi, 671.
20. Tyler: Am. Jour. Roent., 1917, iv, 581.
21. Upson: Ibid., 1921, viii, 385.
22. Case: Ibid., 1916, iii, 332.
23. Kelly: British Jour. Surg., 1920, viii, 137.
24. Horn: Ann. Surg., 1915, lxii, 424.
25. Gross: Jour. Med. Research, 1918, xxxviii, 473.
26. Hupp: N. Y. Med. Jour., 1911, xclv, 422.
27. Pool: Ann. Surg., 1912, lvi, 940.
28. Cullen: Umbilicus and its Diseases, 1916.
29. Jewell: Practice of Obstetrics, 1901, 87.
30. Parvin: Science and Art of Obstetrics, 1895, 134.
31. Am. Text-book of Obstetrics, 1895, 93.
32. Playfair: Midwifery, 1880, 109.

DISCUSSION

Dr. Hubert A. Royster, Raleigh, N. C.—In November, 1920, I had a case of complete transposition of viscera, noticed on account of the fact that the patient had an appendicitis on the left side. Usually these left-sided cases of appendicitis exist in the upper story, because sometimes patients for-

get which side the appendix is on. But in this case all of the signs of appendicitis were present on the left side. We did not see the patient until the attack had reached the subacute stage and we were not sure of the diagnosis. However, the barium meal roentgen ray showed the appendix on the left side, adherent, and all of the viscera transposed. We made a left rectus incision, removed the red, edematous appendix, which was curled upward. The gall-bladder was palpated on the same side. There was also a mild so-called Lane kink.

I simply wish to put this case on record as one of left-sided appendicitis with complete transposition of all the other viscera.

Dr. F. W. Parham, New Orleans, La.—I should like to mention, as a matter of interest, that the late Prof. Chaillé, dean of the medical department of Tulane University and connected with that department for fifty years, reported, when a resident student in Charity Hospital, in the *New Orleans Medical and Surgical Journal*, in 1852, a case of transposition of viscera established by postmortem examination.

Dr. Sherk (closing the discussion).—The last paper that gave the fullest statistics was written in 1912, and in this paper 200 cases of transposition of viscera were tabulated. I collected from the literature I have access to 23 more cases, and later I received a report of 3 others. Since my paper was written I have had another report from the Mayo Clinic showing that since 1910 they found 10 cases that were indexed during that time from a registration of 347,000 patients. This gives one a better idea of the incidence of this abnormality than anything else.

JEJUNAL ULCER WITHOUT PREVIOUS GASTROENTEROSTOMY

By Edward P. Richardson, M.D.
Boston, Mass.

In spite of the extremely active proteolysis which occurs in the upper part of the small intestine during digestion the region of the bowel from the papilla of Vater to the end of the jejunum, under normal conditions, is singularly free from lesions arising in the wall of the intestinal tube. Above the papilla the effect of acid gastric secretion is shown in the common occurrence of gastric or duodenal ulcer; below, as the ileocecal value is approached, ulcers from various specific causes—tuberculosis, typhoid fever, dysenteric infections, etc.—become increasingly frequent. Surgical lesions of the jejunum, except in so far as they are produced by conditions affecting the intestine from without—for instance, adhesions, herniæ, trauma, the extension of newgrowths from adjacent organs—or unless they involve the jejunum in common with other parts of the intestinal tract, are almost sufficiently rare to be considered surgical curiosities.

The exception to this general rule at the present time is jejunal ulcer following gastroenterostomy, which, if reported cases are a measure, is probably the commonest lesion of the jejunum today. It has been estimated to occur in about 1.5 per cent of all cases in which gastroenterostomy is performed. In these cases of jejunal ulcer we have

obvious causative factors in the trauma from operation and the action of acid gastric chyme on a part of the intestinal tract normally exposed to it. In certain cases the persistence of irritating suture material is a further predisposing cause of the jejunal or gastrojejunal ulceration. The ultimate reason, however, why a few cases should develop jejunal ulcer, in spite of all precautions of technic, while the great majority remain free, remains obscure.

In recent articles upon jejunal ulcer, occasional mention is made of the rare occurrence of spontaneous peptic ulcer of the jejunum in individuals in whom no previous operation has been performed. Van Roojen,[1] in 1909, stated clearly the possibility of such a spontaneous occurrence of jejunal ulcer. He says that peptic ulcer of the jejunum, analogous to the peptic or round ulcer of the stomach or duodenum, occurs almost always following gastroenterostomy. Three cases, however, are known to him in which peptic ulcer of the jejunum was found without having been preceded by a gastroenterostomy. These exceptions to the general rule, not commonly recognized in modern literature, he believes of great importance, since from such cases light may be thrown on the obscure etiology of jejunal ulcer.

The importance of jejunal ulcer following gastroenterostomy and the obscurity of its more remote causes lend to such primary ulcers of the jejunum an interest not otherwise justified by their extreme rarity. A recent case of spontaneous jejunal ulcer has led me to look through the literature. My hope was that such a review might add something of value in relation to the more common postoperative type, as suggested by Van Roojen. While this hope has not been justified, it has seemed worth while to collect and analyze reported cases of ulcer of the jejunum occurring without previous operation on the stomach. These cases have considerable interest in themselves, since they are obscure both in etiology and in diagnosis, not hard to overlook on the operating table, dangerous to life, and

yet as isolated cases not sufficiently striking to be sure of finding their way into the literature. While on one hand they approach closely in appearance and course to peptic ulcer of the stomach or duodenum, on the other, occasional instances have a resemblance to cases reported as syphilis of the small intestine. My purpose, therefore, is to gather the facts at present available concerning such jejunal ulcers, with special reference to the recurring statement that peptic ulcer of the jejunum may occur without operation, and to consider the clinical course and etiology of these cases as far as possible from the somewhat meagre evidence at hand.

Ulcers of the intestine, of a type which shows on pathological examination no evidence of a specific causative factor, are not extremely rare in literature. Nor is the idea that such ulcers may be peptic a new one. It is, however, an assumption in regard to etiology for which the evidence is questionable. These ulcers, however, may fairly be classed in accordance with the pathological changes found, which show only a defect, with evidence of necrosis and extension or attempts at limitation and repair, accompanied by inflammatory changes usually slight in degree or by the resulting fibrous tissue. To this extent the pathological picture resembles that of ulcer of the stomach or duodenum, but this resemblance does not necessarily imply a similar etiology. The term usually used for this lesion is simple ulcer, following Cruveiler, who first clearly described such ulcers occurring in the stomach.

Combes,[2] in 1897, collected 36 cases of ulcer of the intestine which appeared to belong to this simple pathological type. Of these, 7 involved the jejunum, 12 the ileum, 5 the cecum, 3 the large intestine, and 3 the rectum. Leotta,[3] in 1919, collected 22 cases of simple ulcer of the jejunoileum, including one personal case involving the ileum. The bowel affected was the jejunum 4 times, the ileum 17 times. While many of the cases reported as simple ulcer

are far from conclusive in themselves, yet it remains clear—after excluding ulceration due to known causes such as typhoid fever, tuberculosis, newgrowth, dysenteric infections obstructive distention, etc.—that there remain ulcers of the small intestine grossly and microscopically of the simple type to which we cannot assign a definite cause.

The following case I saw in consultation with Dr. L. M. Spear, and sent to the Massachusetts General Hospital, believing that his symptoms were due either to perforation of the stomach or to renal stone:

Case I.—E. S., No. 234,549, male, born in Ireland, aged forty-seven years, widower. Admitted January 11, 1920, with the following history: In July, 1919, the patient had an attack of severe general abdominal pain, lasting six hours, during which time he vomited. In September, 1919, a similar attack occurred. There were no gastric symptoms between July and September. After the second attack the patient went to the Boston Dispensary for advice and was put on a diet which was not followed closely. Since September he has had occasional attacks of transient but rather severe pain localized in the left abdomen. For the past two weeks he has noticed that his bowel movements have been black, although no medicine has been taken except Epsom salts and cascara.

Yesterday the patient was seized with such severe abdominal pain in the left lower quadrant, radiating to the left flank and shoulder, that he rolled on the floor. He was given morphia and was able to sleep a little. The pain has persisted up to the present. He vomited once last night and repeatedly this morning. His bowels moved many times yesterday but not today.

He has never had any gastric trouble up to July, 1919, but has always been more or less constipated, for which he took salts. There have been no cardiac or respiratory symptoms. He has had gonorrhea several times, the last

about eight years ago, when a bubo was incised in the left groin. His genitourinary history was otherwise negative.

Physical Examination. Well-developed, well-nourished man, lying on examining bed, looking rather weak, evidently suffering some pain, but not in shock. Skin negative; scar 3 cm. long in left groin. Pupils react to light and distance; equal; movement normal. Ears and nose negative. Mouth shows pyorrhea and sordes. Throat, tonsils, and neck negative. Thorax well developed, expansion equal; lungs clear and resonant. Heart: No enlargement, displacement, murmurs or thrills. The abdomen was tympanitic throughout, the tympany extending 3 cm. above the costal margin; the liver dulness reached from this point to the sixth intercostal space. The patient held his abdomen tensely; no masses or herniæ were palpable. The left side was rigid, and there was tenderness about 9 cm. below the left costal margin and in the left flank. There was spasm over this area of tenderness. Rectal examination was negative. Reflexes negative. Temperature, 98.8°; pulse, 82; respiration 20. White count, 18,400; blood-pressure, 140/190. Urine examination negative. *x*-ray for renal or ureteral stone was negative.

Operation, 3.20 P.M., January 11, 1920. Ether anesthesia. Cloudy fluid was found on opening the peritoneal cavity through the upper left rectus muscle. A perforation of the stomach or duodenum was looked for, but these organs were negative. A small mass was then felt in the bowel, slightly adherent to the posterior abdominal wall, in contact with the splenic flexure. On delivery this proved to be small intestine. The induration was due to a stricture, on the anterior surface of which was a perforation one-eighth inch in diameter. A first attempt was made to close this perforation by incision and suture similar to Heinecke-Mickulicz pyloroplasty. On opening the gut, however, an annular ulcer encircled the bowel at the point of stricture, through which perforation had taken place,

and the amount of constriction and induration made a plastic procedure impossible. An atypical resection was done, removing the ulcer and its margins, without the adjacent mesentery, followed by an end-to-end anastomosis. A resection of the whole loop would have proved easier. The level of the stricture was not exactly determined on account of the patient's condition. It was believed to be within two feet of the end of the duodenum. Closure was without drainage.

Pathological Report (H. F. Hartwell). A review of the microscopic sections from the jejunum shows no evidence of syphilis. The pathological examination is therefore, as follows:

A number of irregular fragments, the largest of which contains part of an ulcer in its mucosa. Its edge is slightly raised and its base is rough. At one portion of the base there is a small perforation passing directly through the wall of the gut. Its peritoneal surface is covered with plaques of fibrin.

Microscopic examination shows an ulcer whose surface is covered with necrotic exudate. Its base is formed by fibrous tissue which extends through the entire thickness of the wall. There is considerable inflammatory exudate on the peritoneal surface. There is no evidence of tuberculosis or malignant disease. Sections stained by Levaditi's method shows no Spirocheta pallida.

Diagnosis. Chronic ulcer.

The patient made a good recovery without complications, and was discharged on February 3, 1920. His Wassermann reaction is not recorded.

X-ray February 5, 1920, *after Operation.* Stomach in medium height; pyloric end appeared further displaced to right than normal. No visible abnormality of filling or outline seen. It was empty in normal time. Sphincter appeared regular and first part of duodenum filled regularly. It appeared oblique in position as though drawn to right.

Ileum was not remarkable. Barium had not entered the cecum at six hours and was in the rectum twenty-four hours, when the cecum was empty and the colon outlined by traces of barium only. The only abnormality noted was the position of the stomach and the duodenum, which is suggestive of adhesions in the right abdomen. No definite lesion found.

On searching through the records of the Massachusetts General Hospital, only one similar case was found. For the privilege of reporting it, I am indebted to Dr. C. A. Porter.

Case II.—W. S., No. 181,349, female, aged forty-eight years, married, born in Russia. Admitted, March 3, 1912, with diagnosis, "Intestinal obstruction; peritonitis."

Negative for tuberculosis, cancer and hemophilia.

Past History. She was never in a hospital except during confinement. She has always had fair health except for constipation and stomach trouble. For years she has been subject to pain in the heart after eating and has vomited a great deal but does not know the color of the vomitus. She has had no cardiorespiratory symptoms. The so-called pain of the heart (epigastrium) has radiated to the shoulders. She has had two children and one miscarriage. Catamenia not remarkable.

Present Illness. She has been indisposed for about seven weeks. A week ago she began to have severe pain about the heart and vomited "awful." Since that time she has been in bed and has vomited occasionally every day. Her bowels have moved with small result. She has seen nothing remarkable in the stool, and has noted no blood in the vomitus. Repeated enemas have failed to give anything like good results. A note from her doctor states that she began to have severe abdominal pain this morning and repeated attempts failed to move the bowels.

Physical Examination. Well-developed and stout Jewish woman, lying in evident distress. Pupils react. Tongue coated; mouth otherwise negative. Chest: Note hyperresonant; breath sounds clear except at base, where there were numerous deep rales. Heart not enlarged; sound regular, fair quality, clear. Abdomen full, rather distended but not rigid. There were numerous blistered areas over the epigastrium, the result of turpentine stupes. No masses are palpable, but tenderness is present through the whole abdomen, more particularly in the epigastrium. No visible peristalsis observed. Rectal: Nothing noted except increased abdominal tenderness. Extremities: Knee-jerks present; no edema. Temperature, 98°; pulse, 112; white count 19,000.

Operation, March 4, 1912 (Dr. C. A. Porter). Ether. On median suprapubic incision thin cloudy fluid and fibrin flakes without order were found; intestines distended and injected. Exploration shows a mass in the right upper quadrant. A transverse five-inch incision was then made along the right costal margin. The tumor was brought into the wound and was found to be a loop of jejunum six inches long, twisted and kinked and bound down by adhesions. On freeing the adhesions, fecal matter escaped from a perforation in the gut. No attempt was made to locate the portion of the jejunum. The bowel on one side of the kink was collapsed, on the other distended. A loop six inches in length was resected and an end-to-end anastomosis done with Pagenstecher. The transverse incision was closed with drainage of the superficial fascia. A rubber tube was left in the pelvic wound.

Pathological Report. A piece of intestine 15 cm. long. Serous surface injected, covered with fibrin. Section shows the walls and mucosa considerably darkened, with a soft, moist appearance. A ragged circular perforation through all coats, $1\frac{1}{2}$ cm. in diameter in one extremity of the gut.

The intestine on one side of the ulceration $8\frac{1}{2}$ cm., on the other side $2\frac{1}{2}$ cm. in transverse diameter.

Microscopic examination of the edge of the ulcer showed a little granulation tissue but no evidence of any newgrowth. The bloodvessels in the immediate vicinity were not specially altered or thrombosed.

Diagnosis. Simple ulcer. Discharged, March 23, 1912.

In neither case was the level of the lesion exactly determined. It seems fair, however, if the ordinary arrangement of the intestinal coils held good in these instances, to accept the operative diagnosis of ulcer of the jejunum, level undetermined, although in Case I the loop involved was probably not far below the end of the duodenum. In neither case is the Wassermann reaction known, although syphilitic exposure would seem possible in Case I on account of the repeated attacks of gonorrhea. Sections of the ulcer, however, were negative for Spirocheta pallida by the Levaditi method. There was nothing suggestive of tuberculosis on microscopic examination in either case. Each presents a chronic ulcer of the jejunum which cannot be assigned to the usual cause of intestinal ulceration. In their pathological findings, chronicity, induration, tendency to cicatricial contraction and ultimate perforation, they have much in common with peptic ulcer of the stomach or duodenum.

The records of 4200 autopsies in the pathological department of the Massachusetts General Hospital, examined by permission of the director, Dr. J. H. Wright, shows no case directly comparable to the above. Further evidence, therefore, depends upon the literature. I have been able to find the following cases, nearly all incomplete in various respects, abstracts of which I present at this point, in order to facilitate a discussion of the general aspects of jejunal ulcer arising without operative interference. Cases from the older literature have been included, since the total number is so few.

(1) Wagner,[4] 1858. A laborer of eighteen years was buried up to the lower chest by a fall of earth. He gave evidence of peritonitis and died twenty-two hours later. Autopsy showed diffuse peritonitis; the mucosa of the stomach and duodenum was normal. After freeing omental adhesions on the surface of the jejunum opposite the mesentery, six inches from the end of the duodenum, an oval hole was found from which intestinal contents flowed. The adjacent mucosa showed normal microscopic structures. The remaining intestine showed no ulceration. A reconstruction of the anatomical changes is most probably as follows: A chronic ulcer of the upper jejunum, gradually consuming all layers, was hindered at least temporarily from perforation by adhesions of the omentum. As a result of burying, the omental adhesion was separated. The jejunal ulcer had the greatest similarity to the so-called perforating or simple chronic ulcer of the stomach, and at all events is analogous to it.

(2) Taylor,[5] 1865, a man, aged forty-five years, given to drinking, who, after drinking beer freely and being thrown in a wrestling match, complained of having strained himself in the abdomen. He walked home, a distance of a mile, and complained of intense pain from this time until his death, which took place fifty hours after the accident. The postmortem showed evidence of a severe peritonitis, and a small aperture which would not admit a pinhead was found in the jejunum. This aperture seemed to have been the result of an ulcer which had commenced on the outer surface of the intestine.

(3) Perroud, 1866 (abstract from Combes[2]). A cooper, aged thirty-two years, in good general health, suffered for three months from slight dyspepsia. While at stool he felt a violent colic, soon followed by three periods of syncope. The pain continued; symptoms of peritonitis and obstruction developed; death occurred about thirty-six hours after onset.

Autopsy showed acute diffuse peritonitis. No intestinal obstruction was found, but in the right hypochondrium, in a loop of the small intestine near the end of the duodenum, a small, rounded opening was demonstrated the size of a lentil, situated at the level of the mesenteric insertion, communicating with the interior of the intestine, and explaining the presence of gas and feces in the peritoneal cavity as well as the acute peritonitis. The walls of the intestine in the neighborhood of the perforation were red, a little thickened and much softened. The remainder of the digestive tube is entirely sound. No alteration in the other organs. Tubercles were nowhere in evidence.

This case appears to be an example of simple ulceration of the small intestine, which one can compare with those ulcerations of the stomach which develop without much inflammation and which only show themselves during life by very slight symptoms of dyspepsia.

(The author does not state definitely whether the perforation was above or below the end of the duodenum. From the terms of the description and the presence of fecal matter in the abdominal cavity it seems probable that the jejunum was involved.)

(4) Rivirdin, 1867.[6] A man aged fifty-five years, of alcoholic habits, died after two days of vomiting and obstipation.

Autopsy showed evidence of peritonitis. On the right, halfway between the iliac crest and the liver, was an intestinal perforation. The stomach and duodenum, very slightly dilated, presented no alteration of their mucosa. The mucosa of the intestine was normal throughout except at the level of the perforation. The latter was situated on the free border of the intestine, at the level of the middle part of the jejunum. It was almost round, the size of a fifty centime piece. Its margins, shaped as by a punch, were a little thick and turned back from the serous side. No foreign body was present in the intestine. The remain-

ing organs were essentially negative. No lesion of the abdominal aorta.

(5) Simpson, 1897.[7] A man aged fifty-six years, by trade a malster, whose mental condition at death was one of dementia consecutive to chronic mania, collapsed and died suddenly. He was accustomed to devour filth and rubbish of all sorts. He had complained only of slight pain and constipation.

Autopsy: No marks of injury. The peritoneal cavity contained about thirty ounces of bloodstained serum but no fecal matter. The mucous membrane of the alimentary canal was everywhere normal except at a point six inches below the beginning of the jejunum, where there was a single ulcer about 6 mm. in diameter, irregularly circular in outline and with clean-cut edges which showed no signs of chronicity, perforating through all its coats. A few shreds of wood-fiber were the only foreign bodies in the alimentary tract, and no extraneous substance was discovered in the peritoneal cavity. The gall-bladder contained stones. The heart showed hypertrophy and dilation; there was well-marked degeneration of the myocardium; the aortic valves were somewhat thickened. Both kidneys were in an advanced condition of interstitial nephritis.

The lesion of the jejunum was regarded by those present as being the homologue of perforating gastric ulcer and the acute ulceration of the duodenum which is often found as a sequence of severe burns or scalds; but there seems a possibility that it may have originated by injury of the intestinal wall by some foreign body introduced by the mouth.

(6) *British Medical Journal*, 1906, vol. i, page 718, a medico-legal case. A man aged fifty-seven years who had been under treatment for heart disease, hydrocele and stricture, on the morning of February 10, while carry-

ing a tray and passing through a door, ran against the corner, hurting himself. He died suddenly at 1 A.M., February 12. At the postmortem examination a bruise was seen in the left groin, and a slight bruise on the internal abdominal wall corresponding with the bruise on the surface. The bruise was about a foot from the spot where the ulcer of the intestine had ruptured. Death proved traceable to a perforation of a small chronic ulcer of the small intestine, eight feet from the stomach, through which a few drops of fecal matter had percolated, and there were signs of commencing peritonitis.

(7) Schmilinski (1910,[8] reported a case of stenosing ulcer of the jejunum. The patient, a woman aged sixty-three years, for years had pain in the stomach, with vomiting of blood and melena on two occasions. Findings three years ago: Obstructive incompetence of the stomach with residue; hypersecretion.

Diagnosis: Stenosing ulcer of the pylorus or duodenum. Until January, 1909, she was free from pain by means of diet and lavage, when a recurrence of the pain developed. In the fasting contents no free hydrochloric acid was found. instead of which was an admixture of bile. Air blown into the stomach emptied itself into the duodenum remarkably quickly for a pyloric stenosis.

At operation the duodenum and beginning of the jejunum were found dilated. Four cm. below the duodenojejunal fold was a stenosing induration of the jejunum and adjacent mesentery. Resection; recovery. The specimen showed on the mesenteric border of the stenosis a small ulcer which, as well as its surroundings, showed microscopically the signs of chronic inflammation.

In the discussion, Fränkel had observed a similar case, in which he arrived at a diagnosis of syphilis by means of staining the elastic tissues. Again, in a case of phthisis, he found a stricturing ulcer at this point. The present

case appeared to him syphilitic. Katz raised the question whether at the examination of the patient, three years previously, a pyloric incompetence might not have already existed. In this case it was possible that as a result of the existing hypersecretion a peptic ulcer might have developed which had led to a stenosis.

Schmilinski, in closing, said that at the previous examination, whether or not the pylorus was capable of closing was not determined. The previous statements have given great weight to the acceptance of a syphilitic etiology for the ulcer. The elastic fibers were not investigated. The remaining findings gave nothing of note either for syphilis or for tuberculosis.

(8) Cade (1913)[9] reported the case of a man aged twenty-five years, a grocery clerk. Entered June 23, 1912; died June 24, 1912. Health habitually good. Denies excessive drinking and syphilis. A month ago he had moderately severe pain in the left iliac fossa, relieved by medicine, so that he was able to continue his work. Ten days ago the pain returned. A large mass was found at this time in the left iliac fossa. He then improved somewhat and was able to come on foot to the hospital. At 8 P.M., shortly after his arrival he felt a violent stabbing pain in the lower abdomen. Copious vomiting, complete obstipation, hiccough and the development of great distention ensued. Collapse and death occurred the next morning.

Autopsy showed the abdomen full of pus. In the left iliac fossa the intestine presented a perforation; pressure forced out the contents. The perforation was situated in a loop of small intestine adherent to the pelvic colon. On dissecting the intestine nothing abnormal was found in the large intestine or appendix. In the small intestine, about 60 cm. below the duodenum, the affected loop was found. At this point there was a thick, circular zone formed of fibrous tissue about 1 cm. in breadth, which, however, did not cause a stenosis. Immediately above this zone there

was a blackish necrotic area, and it was at the middle of this that the perforation was situated, about 5 mm. in diameter, with ragged edges. The remaining small intestines were negative, as were the kidneys, heart and lungs. Many mesenteric glands were hypertrophied. Microscopic examination of the edge of the ulceration showed thickening of the intestinal wall, inflammatory infiltration and necrosis of the mucosa. No change was found suggestive of tuberculosis. A section of the mesentery showed the vessels permeable; of a mesenteric gland, recent inflammatory changes.

(9) Murphy (1916)[10] reports the case of ulcer of the duodenum and jejunum. The patient, a man aged sixty-two years whose family and past histories were negative, had suffered for fifteen years with digestive disturbances, worse during the past four years, with a tendency to periodic attacks about once a month. The principal symptoms have been pain in the epigastrium and vomiting. Six weeks ago there was evidence of near perforation in the upper abdomen followed by abdominal soreness and tarry stools. A few days later hematemesis occurred. Skiagrams revealed obstruction to the outlet of the stomach and involvement of the gall-bladder. The diagnosis was duodenal ulcer with attempts at perforation and sequential adhesions.

Operation. "As we explore the upper abdomen we find the gall-bladder empties itself easily but is adherent to the duodenum. The upper surface of the arch of the duodenum is involved in an extensive inflammatory induration which indicates the site of a duodenal ulcer. . . . There is another ulcer in the first part of the jejunum. This is but the second ulcer I have seen in this situation."

Anterior gastroenterostomy was performed. The patient reported as much improved three months later.

(10) Bryan (1916)[11] reports the case of a man aged forty-eight years, who twenty-five years previously had

typhoid fever and two years later a mastoiditis, which resulted in unilateral deafness and a sinus still persisting. He never drank, nor used tobacco. In the last four years he has had severe attacks of indigestion with recurring frequency of late, characterized by violent cramps in the region of the stomach. Two years ago he had constant pain and nausea which continued for four months. He vomited constantly but never noticed any blood. A diagnosis of ulcer of the stomach was made. The pain and nausea, although somewhat relieved by gastric lavage, have persisted, so that he has been unable to do any regular work for three years. September 8, 1915, at 11 A.M., he was seized with agonizing pain in the abdomen and groin. At 8 A.M., the picture was that of acute abdomen and the diagnosis of probable perforation of ulcer of the stomach was made.

Operation was refused until 8 P.M. The peritoneal cavity was full of greenish fluid with flakes. The stomach was atrophic, hard, bound down, pulled to the left and firm; the walls white and heavy; the omentum shrunken and thick. The duodenum was plastered down; the jejunal wall was likewise indurated, whitish and thickened, and on its anterior wall about three inches from the duodenojejunal junction a round, punched-out ulcer the size of a cherry-stone was found. The induration of the jejunum extended several inches below the point of perforation and tapered off gradually in the jejunal wall. Closure of the perforation with omentum. Death. No autopsy.

These cases, with the 2 reported in this paper, make the whole basis, so far as I have been able to find it, for a discussion of the spontaneous occurrence of peptic ulcer in the jejunum. Some of the cases are so incomplete as to be practically worthless, yet as a whole they form a clinical group with a good deal in common, and as far as the evidence goes seem to be instances of simple ulcer. My aim has

been to be inclusive rather than critical. Only 1 case is confirmed both by microscopic examination and autopsy, only 3 others by microscopic examination, and of the 6 remaining autopsies several are very briefly reported.

Of the 12 cases 9 occurred between the ages of forty-five and sixty-three and 10 were in men. In 5 autopsies in which the condition of the whole bowel is mentioned, the jejunal ulcer was the only one present in the intestinal tract, excluding for these cases a general ulcerative process. In the remaining cases, only one intestinal ulcer was actually demonstrated although more might exist. In 6 cases, confirmed five times by sutopsy, and once, in my own case, by operative evidence and *x*-ray, the stomach and duodenum were apparently negative. Two cases, those of Murphy and Bryan, showed a lesion of the duodenum or stomach. In 4 cases the condition of these organs is uncertain. The most frequent situation for the ulcer was within a few inches of the end of the duodenum, occurring there 5 times. The other ulcers lay between this point and the middle of the jejunum, or possibly lower. The ulcer in 7 cases showed evidence of chronicity, and was associated 3 times with a definite stricture of the bowel. In 2 cases the ulcer seemed acute, in the remaining case the point is not clear. Perforation occurred 10 times in the 12 cases.

Description of the ulcer itself is rather vague: Three times its general resemblance to ulcer of the stomach is noted, twice more its punched-out character is mentioned. Only once was it apparently annular; in general it appeared to affect a limited part of the bowel circumference. In the 3 cases with constriction of the bowel it is hard to say whether the constriction was the effect or the cause of the ulcer, although the former seems to be the case. In 1 case (Cade) the perforation took place above a zone of fibrous tissue in the intestine.

The microscopic examination in 4 cases showed the

changes associated with simple ulcer without evidence pointing toward a definite cause, infectious or otherwise. In only 1 case did this examination include the mesenteric glands, which showed only inflammatory changes. These findings are of some negative value in excluding tuberculosis, but are of little positive help in connection with the cause of the ulcers. One case examined by the Levaditi method showed no Spirocheta pallida. In no case is the Wassermann reaction known.

Since some of these ulcers are definitely chronic in course, it is conceivable that they might prove a starting-point for the rare cases of cancer of the jejunum. I am unable to find evidence for this point. Hertzog[12] reports a case in which two primary cancers, one of the ileum and one of the ileocecal valve, developed on the site of old tubercular ulcers.

Little ground exists for a discussion of the etiology of these ulcers either as a group or as individual cases. In 2 cases alcoholism; in 1 chronic dementia, filthy habits of eating, and interstitial nephritis; in another, stricture of the urethra and heart disease may be contributing factors; they hardly suffice as a complete explanation for the occurrence of the jejunal ulcer. In 1 case (Schmilinski) syphilis might have been an adequate cause. But as a whole we can only say that there are certain types of intestinal ulceration to which the majority at least of these cases do not belong. Ulcers of a dysenteric nature may be excluded, since such cases would show a diffuse ulcerative process lower down in the intestinal tract, a condition excluded by the cases coming to autopsy and not suggested by the clinical history or operative findings in the remaining cases. Nor is it likely that these cases, with as far as known a single destructive lesion high in the intestinal tract, belong to the rather indefinite groups of catarrhal, follicular and toxemic intestinal ulceration. Further, the evidence does not favor a recent gross embolism or thrombosis.

Active typhoid fever may be excluded as a cause. While typhoid ulcers may involve the jejunum, and even perforate it, they are rare at this level. Further, typhoid ulcers usually heal without cicatricial contraction and would be unlikely to leave an area of lowered resistance in the jejunum.

Instances of perforation of the small bowel due to stasis and distention above the obstruction are not rare. Such cases have not been included when recognized, since the cause of the ulceration seemed definite. In Case II, this cause should be considered, but here the ulcer occurred at the point of greatest constriction and not above it. In Cade's case, where the perforation took place above a zone of fibrous tissue, there was no stenosis.

Strangulation of the bowel may lead to cicatricial stenosis. Intestinal ulceration and perforation may occur above or at such a stricture. Sestier,[13] in 1827, reported a case of perforation of the jejunum occurring from this cause following a successful operation for strangulated hernia. Meyer[14] has shown that a stenosis persisting after strangulation of the bowel is not necessarily double, although the intestine is commonly constricted at two points. In a review of the literature he found that a stenosis might develop either from the whole incarcerated loop—forming a relatively long narrowing—or only from the parts of the loop of bowel actually constricted by the hernial ring. In the latter case, single and double narrow stenosis were reported in the literature with equal frequency. There is no reason for suspecting a stricture due to previous strangulation as the cause of jejunal ulcer in the present series of cases; it must, however, be considered a possibility.

Active tuberculosis as a cause of the ulcers seems improbable, since in most cases it would be recognizable on gross examination. Tuberculosis of the jejunum alone is rare. In 49 cases of tubercular ulcers of the small intestine found among 4200 autopsies at the Massachusetts General Hospital the ileum was involved 43 times, the

jejunum and ileum 5 times. One child of two, dying of generalized tuberculosis, showed a few groups of non-ulcerated tubercles in the jejunum only. Gross perforation of the ileum into the peritoneal cavity occurred 3 times. The fact that perforation of a tubercular ulcer is unusual, occurring in only from 1 to 5 per cent of all cases, according to Cruice,[15] is hardly an argument against tuberculosis in such a rare lesion as the one under discussion.

In the case of a healed or nearly tubercular lesion of the intestine, resulting in a stricture or an area of lowered resistance, the primary cause might not be found on gross examination and might even be overlooked microscopically if the mesenteric lymph glands were not examined. Yet such an area might be subject to secondary ulceration from sepsis or irritation. That this is possible is shown by a case of Lazerevic,[16] where a stenosing chronic ulcer of the jejunum led to diffuse peritonitis, the tubercular nature of the lesion becoming apparent on microscopic examination. It is undeniable that some of these jejunal ulcers may have been tubercular in the beginning, but this does not satisfactorily explain the group as a whole, particularly since the cases coming to autopsy do not record tuberculosis in other organs.

The surgical importance of syphilis of the stomach is well recognized. It is less generally appreciated that syphilis of the small intestine may cause surgical lesions. Both congenital and acquired syphilis may affect the small intestine. The former is less rare, being observed at autopsy in infants dying of hereditary syphilis, and is not of immediate importance. Obendorfer,[17] in 1900, collected 24 cases of acquired syphilis of the intestine, in 5 cases associated with syphilis of the stomach. The small intestine was affected in 18 cases, in half of which the jejunum or jejunum and ileum were involved. Perforation occurred twice. Weiss,[18] in 1902, found that perforation occurred 7 times in 35 cases of syphilis of the intestine. Fränkel,[19]

in 1910, reported 3 cases of acquired syphilis of the small intestine, situated twice in the jejunum and once in the ileum, the only ones observed in a material of about 19,000 autopsies. He adds 4 other cases of possible syphilis of the small intestine occurring in the literature since 1900. He believes that there has been much confusion in the past between tuberculosis and syphilis of the intestine. Even admitting that many of the cases previously described as syphilis may have been partly healed tuberculosis or intestinal ulcers or strictures due to other causes, the occurrence of syphilitic ulcers and strictures of the small intestine seems certain. The presence of Spirocheta pallida has been shown in acquired syphilis of the small intestine by Arkin,[20] and in congenital syphilis by various observers.

MacCallum[21] describes the lesion of acquired syphilis as follows: "Tertiary lesions of the small intestine are usually localized in the jejunum, where they appear as flat elevations of the character of syphilitic granulation tissue involving mucosa and submucosa. Multiple ulcers are formed, which extend in the forms of rings around the gut and which in healing may produce strictures."

The proof that a lesion of the small intestine is syphilitic is not easy. It may be suggested clinically by the history, by the effect of antisyphilitic treatment, or by the Wassermann reaction. The gross appearance of the intestinal lesion may be suggestive and may be supported by syphilitic lesion in other organs. Similarly the microscopic examination may be strongly suggestive of syphilis, particularly in the presence of endophlebitis and endarteritis with gummatous infiltration. But there is no conclusive point by which the nature of the syphilitic lesion may be recognized in all its stages unless the Spirocheta pallida is demonstrated in the lesion. Conversely, the exclusion of syphilis as a cause of intestinal ulceration is correspondingly difficult.

For a consideration of syphilis the evidence in the present series of cases is lacking. It is true that in no case except

Schmilinski's is there a history suggesting syphilis, but in no case is the Wassermann reaction known. The gross lesion described as syphilis of the small intestine—girdle-like, constricting ulcers, usually multiple, occasionally with diffuse infiltration of the bowel wall—do not correspond with the lesion described in these cases, with the possible exception of Case I, Schmilinski's and Bryan's. We can only say that syphilis produces a type of ulceration leading to stenosis and occasionally to perforation, which, in contradistinction to other types of intestinal ulceration, affects the jejunum more frequently than other parts of the small intestine, and thus forms an exception to the general rule of the higher resistance of the jejunum to pathological changes. Whether some of the cases included as simple ulcer of the jejunum are syphilitic in origin cannot be stated.

It is only after the exclusion of the causes previously mentioned that the question whether these ulcers of the jejunum should be classed as peptic ulcers can fairly be discussed. I take peptic ulcer to mean, in the usual clinical sense, an ulcer in the production of which the acid gastric secretion is an important factor, the remaining factors necessary for ulcer formation not yet being entirely clear. In the 5 cases in which the ulcer occurred close to the end of the duodenum it is possible that the acid gastric juice may have been a factor. In the 2 cases with an associated lesion of the stomach or duodenum the ulcer was in this situation. In these cases it is possible that interference with pyloric control, through cicatricial involvement or otherwise, might permit a discharge of gastric contents in such a fashion that neutralization in the duodenum did not occur. In the cases without a lesion near the pylorus, persistence of the gastric acidity in the jejunum is harder to imagine. As for the remaining cases, occurring lower in the jejunum, their position alone would seem to exclude acidity as a possible factor.

To explain the ulcers lower in the jejunum, the question of a digestive ulcer from alkaline jejunal contents arises. While such a condition is conceivable, particularly secondary to a preëxisting lesion, the mass of clinical experience is against this assumption, and it can only be considered a possibility for which confirmatory evidence is lacking. It seems clear, however, that these jejunal ulcers as a whole cannot be classed as peptic ulcers in the usual clinical sense.

The etiology of these cases, therefore, remains in doubt. Nor is it at all clear that they should be considered a group with a common cause. Their clinical resemblance may well be due more to their situation than to their etiology. The usual clinical course is a sudden peritonitis from perforation without previous warning, as occurred 6 times, associated in 3 instances with more or less trauma; in 1 case perforation followed a definite attack of localizing peritonitis; 4 cases gave upper abdominal symptoms more or less suggesting gastric or duodenal ulcer—in 2 of these a definite gastric or duodenal lesion existed; 1 case only gave symptoms which might suggest the lesion. Here the symptoms suggested pyloric obstruction, but air blown into the stomach emptied itself into the duodenum remarkably quickly, and bile was found in the fasting contents, thus suggesting an obstruction below the duodenal papilla. The only possibility of diagnosis previous to perforation would appear to depend on the demonstration of a jejunal stenosis by clinical or *x*-ray evidence.

Five cases were operated on: In 3, the jejunum was resected; in 1 a gastroenterostomy was done for associated duodenal ulcer—these cases recovered; 1 case of advanced peritonitis with closure of the perforation with omentum died. The remaining cases died without operative interference.

The operation of choice, on account of the danger of perforation, appears to be resection of the bowel or possibly excision of the ulcer. Shortcircuiting, by gastroenterostomy

or otherwise, may be necessary for a stenosing ulcer in which resection is not possible or when there is associated disease of the stomach or duodenum. In desperate cases, closure of the perforation by the means most readily available is the obvious course.

To sum up, the literature gives evidence of the rare occurrence of jejunal ulcer, apparently of simple type, resembling somewhat peptic ulcer of the stomach or duodenum, and having a similar tendency to perforation occasionally to cicatricial stenosis. No sharp line can be drawn between these simple ulcers of the jejunum and similar ulcers occurring lower in the small intestine. While for the purposes of this paper jejunal ulcers only have been considered, it would seem more rational to discuss as one inclusive group, simple ulcers of the jejunoileum. Whether these represent a clinical entity or are merely the odds and ends of various pathological processes, cannot be asserted.

The 2 cases of jejunal ulcer reported in this paper appear to be instances of simple ulcers affecting the jejunum. Such ulcers occur chiefly in males beyond middle life. No definite etiology may be assigned to them. It is possible that in so rare a condition there may be almost as many causes as cases. In the cases where jejunal ulceration occurs close to the end of the duodenum, it is possible that disturbance of pyloric control may lead to gastric contents reaching the jejunum without neutralization and so to the formation of true peptic ulcer. For ulcers situated lower in the intestinal tract this cause seems improbable. Since syphilis produces a form of intestinal ulceration which affects the jejunum more readily than the ileum, and also has a tendency to cicatricial contraction and perforation, it must be considered as a possible cause of ulceration in some of these cases, although definite confirmatory evidence is lacking. Two points are of particular importance in future cases: A careful microscopic study of the lesions, including if possible the mesenteric lymph nodes, and the deter-

mination of the presence or absence of syphilis. Whatever the cause, the occurrence of perforation gives these ulcers a definite surgical importance, the more so since the perforation does not take place in one of the regions in which we are accustomed to search for it. The present summary is merely offered to call attention to this type of ulcer and the possible relation of some of these cases to syphilis of the small intestine.

Bibliography

1. Von Roojen: Arch. f. klin. Chir., 1909, xci, 381.
2. Combes: Les ulcères, simple de l'intestin, Thèse de Toulouse, 1897.
3. Leotta: Arch. Ital. di Chir., 1919–1920, i, 349.
4. Wagner: Arch. f. Physiol. Heilkunde, 1858, n. f., ii, 280.
5. Taylor: Guy's Hosp. Reports, 1865, xi, 282.
6. Rivirdin: Bull. et mém. Soc. anat. de Paris, 1867, 2d s., xii, 597.
7. Simpson: Practitioner, London, 1897, lviii, 165.
8. Schmilinski: München. med. Wchnschr., 1910, lvii, 1616.
9. Case et al: Progrès méd., 1913, No. 24, p. 309.
10. Murphy: Surg. Clin., 1916, v, 431.
11. Bryan: Surg., Gynec. and Obst., 1916, xxii, 279.
12. Herzog: Beitr. z. path. Anat. u. z. allg. Path., 1912–1913, lv, 177.
13. Sestier: Bull. et mém. Soc. anat. de Paris, 1827, iii, 33.
14. Meyer: Deutsch. Ztschr. f. Chir., 1905, lxxvi, 297.
15. Cruice: Am. Jour. Med. Sci., Philadelphia, 1911, n. s., cxlii, 683.
16. Lazarevic: Deutsch. med. Wchnschr., 1919, xlv, 123.
17. Obendorfer: Virchows Arch. f. path. Anat., 1900, clix, 179.
18. Weiss: Centralbl. f. d. Grenzgeb. d. Med. u. Chir., 1902, v, 577.
19. Fränkel: Virchows Arch. f. path. Anat., 1910, cic, 131.
20. Arkin: Tr. Chicago Path. Soc., 1909–1912, viii, 224.
21. MacCallum: Text-book of Pathology, 1916, p. 656.

TRAUMATIC AND INDUSTRIAL HERNIA

REPORT OF THE SPECIAL COMMITTEE OF THE MEDICAL SECTION OF THE AMERICAN RAILWAY ASSOCIATION

WILLIAM B. COLEY, M.D., New York (*Chairman*), Chief Surgeon New York Central R.R

SOUTHGATE LEIGH, M.D., Norfolk, Va., Chief Surgeon, Virginia Railway.

JOHN B. WALKER, M.D., New York, Consulting Surgeon, Pennsylvania R.R.

C. W. HOPKINS, M.D., Chicago, Chief Surgeon, Chicago & Northwestern R.R.

J. A. HUTCHISON, M.D., Montreal, Chief Surgeon, Grand Trunk Railway.

The great increase in social legislation in recent years has made the subject of traumatic hernia one of vital importance to every industrial organization.

The first Workmen's Compensation Act was passed in Germany in 1884. Similar laws were soon adopted in Austria, and later in Denmark, Norway and England.

In 1916, thirty-three states and territories in the United States had enacted some form of workmen's compensation act, and since that time other states have been rapidly following the lead. Therefore, traumatic or industrial hernia, at first largely a question of theoretical interest, has become one of great practical importance. In spite of this there has been no definite attempt made to standardize our knowledge of traumatic hernia, particularly as regards its etiology.

In the recent past the question of compensation has too

often rested upon the power of the plaintiff's attorney to stir the emotions of the jury, rather than upon a carefully weighed judgment based upon a knowledge of the facts relating to the origin of traumatic hernia.

The time has now come when these cases are being gradually taken out of the hands of emotional juries—the members of which, no matter how fairminded, are naturally lacking in the technical knowledge of the etiology and pathology of hernia—and being passed upon by experienced physicians. Therefore, it is of greatest importance that all of the facts bearing upon the etiology of hernia should be collected and classified and made readily available.

The term "traumatic hernia" has been used in a very general way to include, first, the small group of cases in which the hernia is due to direct violence; second, an occupational hernia, or perhaps, as better classified by the French, "hernia of effort," which includes all of those cases in which the hernia appears during heavy lifting, slipping, falling, coughing, sneezing, or any cause whatever which increases the intra-abdominal pressure; and third, "hernia of weakness," which is due to abnormal or defective development of the abdominal wall at the various hernial sites.

The first group of cases is so exceedingly rare that it may be disposed of in a few words. In true traumatic hernia due to direct violence the tissues must have been punctured by some more or less sharp object which has forced its way at least through the muscles and fascia, if not quite to the peritoneum. Personally, we have never seen a case of true traumatic hernia. We have known of one treated by one of our colleagues: The muscles about the inguinal canal were torn by the horns of a bull and a hernia developed shortly after. So this group of cases can be practically ruled out of consideration. The third group, hernia of weakness, due to congenital weakness of the abdominal muscles or weakness through disease, causing atrophy of the muscles, is also very rare, as weakness alone, without

the presence of a preformed congenital sac, rarely results in a hernia no matter how great the intra-abdominal pressure. These are practically all of the direct type.

The very large group of cases which is ordinarily designated as traumatic hernia—and which should be more properly called occupational hernia or, better still, hernia of effort—furnishes the basis of nearly all of the medico-legal or compensation cases of hernia. The word "rupture," the old English name for the disease hernia, is responsible for the traumatic theory of the origin so widely held by the laity as well as by many medical men who have given but little study to the subject. This theory gained a foothold before operation, for the radical cure came into general use and before the etiology of hernia was generally understood. With the rapidly increasing knowledge of the subject, derived from a very large number of operations that have been performed in the last quarter of a century, our ideas of the causes of hernia have gradually changed. At present it is almost universally recognized that the all-important cause of hernia of all varieties is the presence of a preformed sac of peritoneum, known as the processus vaginalis. This view was held by two noted surgeons of the eighteenth century, Pelletin and Cloquet; but only in recent years did Russell, of Australia, by his patient investigations, force us to conclude that practically all herniæ are of congenital origin, due to this open pouch of peritoneum which has existed since birth. Unfortunately, courts and juries and compensation laws here and abroad have not kept pace with the developments of surgery, and it is still not unusual to see large damages awarded in cases of so-called traumatic hernia. Russell maintains that an acquired hernia does not exist, and recognized authorities on hernia have come to agree with Russell's conclusions.

Prior to the adoption of the workmen's compensation acts there were a considerable number of medico-legal decisions in cases of so-called traumatic hernia both in

Europe and in America. Many of our compensation boards have simply followed along the lines of decisions handed down by European courts. Sheen,[1] who has made a careful study of the subject of traumatic hernia in England, states that "The arbiter in these claims, in the mass of ill-understood technicalities, following the lines of least resistance, has given judgment in favor of the workingman—the *post hoc ergo propter hoc* view being naturally considered the easiest one."

In Switzerland, a person suffering from a hernia and desiring compensation is entitled to indemnity only on the following conditions: (1) It must appear suddenly; (2) it must be accompanied by pain; (3) it must be of recent origin; (4) there must be proof that the hernia did not exist prior to the accident.

In Germany, in order to establish a claim, the sufferer from hernia must have had an examination within forty-eight hours of the accident; the hernia must have appeared suddenly, must have been accompanied by pain, and must have immediately followed some accident. Proof must be furnished that there was no hernia prior to the accident.

While there are no published records showing the results of the New York Compensation Board, Sellenings, through the courtesy of a medical officer of the commission, has obtained certain important data. The commission thus far has considered traumatic hernia as extremely rare. The opinion was ventured that it occurred in possibly 1 of 10,000 cases.[2]

[1] Practitioner, London, 1909.

[2] Since this report was made, the following data have been very kindly furnished to us by Mr. Frank V. Whiting, General Claims Attorney of the New York Central R. R. Co. He writes:

"The New York Compensation Commission has never published any statistics or information in relation to hernia.

"For some time, the Board has rather inclined to the view taken in your Committee's report, that is, that hernia is not generally the result of a trauma, yet, there was an unwritten rule established that if the

Commenting upon these statistics, Sellenings states:

"(1) Traumatic hernia is but a surgical curiosity and assumes no practical importance; (2) only a small number of the cases have been carefully investigated; (3) a great proportion of the cases seem to be relegated to the convenient classification of 'vocational hernias'. Whatever may be said of the attitude of the New York Commission applies equally well to many other sections of the country."

One of the most recent and on the whole judicial discussions of the subject, "traumatic hernia," or, as the author terms it, "compensable hernia," is contained in a book on *Industrial Medicine and Surgery*, by Harry E. Mock (assistant professor of industrial medicine and surgery at Rush Medical College), published in 1919.

Mock calls attention to the fact that "The decisions of established medicine date back to the precompensation days and were based on the testimony of expert authority made in the courts of England specially, and later in our own courts, to the effect that a traumatic hernia could only occur from a direct violence resulting in a definite tearing or rupture of the abdominal wall. All other hernias

employer offered a correcting operation, and it was refused, an award would be made for eight weeks' disability and the case closed. This practice has prevailed up until very recently.

"In the case of Al. v. P., 223 N. Y. 97, decided two or three years ago, a hernia was claimed as the result of a strain, and the award was made, but subsequently denied by the New York Court of Appeals on the ground that there was no cause or relation between the strain and the rupture. This resulted in a strengthening of the prevailing opinion that trauma was a doubtful cause of the hernia.

"However, recently, beginning with the case of J. v. D. C., in the Court of Appeals, decided March 15, 1921, there has been a trend the other way. The J. case specifically decided that the facts indicated that the claimant, while lifting a box of clay weighing over 700 pounds, strained his side and a hernia resulted, and the Court stated that there was no doubt that it was an accidental injury within the meaning of the statute, and rendered a decision accordingly."

These quotations are sufficient to show how completely at sea both Courts and Compensation Boards are at the present time on the subject of Traumatic Hernia.

were claimed to be due to congenital defects, preformed sacs, and were similar to all other disease which might occur coincidental with occupation but not related to it. Such testimony was sustained by practically every court, and their views were considered as the decisions of established medicine." He states that "Naturally few claims for traumatic hernia were made, although employees in those days, just as frequently as at the present time, blamed their work for the condition."

The greatly increased number of claims for compensation for hernia at present he regards to be due partly to the new attitude on the part of industry in the direction of recognition of certain moral obligations, as well as the realization that any improvement in the condition of employees renders them more useful and more efficient. He states that, among broad-minded employers, the question of whether there was such a thing as traumatic hernia for which they could be held legally responsible caused little concern.

"They were not governed by the decision of established medicine nor of established law, but based their decisions upon a just and good business sense. If they employed a man with a hernia they knew the industry was not responsible for it. If it grew gradually worse without any definite accident or excessive occupational effort, it was due to natural causes and again they were not responsible. But if, as a result of accident or severe strain, this hernia became strangulated, at once doubt as to responsibility entered the case and the decision was therefore rendered in favor of the employees. If they hired a man who showed no sign of rupture at his employment examination, but who later suffered an accident or a severe occupational strain, and as a result the hernia appeared, compensation and free surgical care were given, because, in the man's mind, the accident caused the trouble, and because they recognized that to a certain extent the occupation was contributory to the final development of the condition.

"From the standpoint of efficiency it was found that a man with a hernia was about 25 per cent less efficient than the man without one; therefore these concerns might refuse to employ men with a rupture, but they became more and more liberal regarding the repair of such a condition when it developed in an old employee."

Mock states that, "Such was the attitude of several concerns at the time of the passage of the employees' compensation acts. In fact, those very laws were an expression of this new humane influence which had entered industry. The administration of these acts was placed in the hands of industrial commissions whose members were laymen rather than lawyers. Influenced by the generous attitude of certain industries and guided by this sentiment and a consideration of moral rights, combined with their meagre legal knowledge, the decision of these various commissions were often at variance to those rendered by the courts in the past.

"Thus employees began to seek compensation for many conditions which heretofore had not been considered compensable, and included among these were hernias which developed during employment."

Mock states: "The question of traumatic hernia, therefore, simmers down to three considerations:

"1. A proper definition of what is meant by traumatic hernia.

"2. To what extent must an accident or an occupational hazard which only partially contributes to the development of a condition be held responsible for the same?

"3. In which cases should compensation be paid by the employer?"

Mock fully agrees with our own opinion, and that of practically all surgeons who have had much experience with hernia, that hernias as a result of direct violence are very rare. He states that many of the best authorities have enlarged the scope of traumatic hernia so as to include

these cases which result from the indirect application of force causing greatly increased intra-abdominal pressure. This adoption of a broader definition, however, Mock believes, would mean the inclusion of many additional hernias in the compensable group, thus greatly confusing the question. We believe it would be much better to restrict the name of traumatic hernia to the very small group limited to direct violence.

Other types of hernia for which the occupation is more or less responsible are described by Lotheissen and other writers as "accidental hernia."

Mock has personally observed only 5 cases of true traumatic hernia due to direct violence at the point where the hernia developed. He cites these five examples as follows: "(1) Man struck in the right groin by the sharp end of a crowbar. (2) A brakeman was crushed between the bumpers of two cars and a ventral hernia appeared. (3) A man was running through the aisle at fire-drill and struck his left inguinal and scrotal region against a truck handle. A large contused area, swelling and hemorrhage into the scrotum immediately followed; within three days a definite left direct inguinal hernia appeared. (4) A pregnant woman was kicked in her left lower abdomen by her husband, and very shortly a ventral hernia appeared and naturally increased in size as pregnancy developed. (5) A cowboy came to my clinic with two enormous oblique inguinal hernias; he gave a history of, some two years previously, having had a horse he was riding rear and fall over backward, pinning him beneath the saddle; the pommel of the saddle had crushed into his lower abdomen; immediately there was bulging in both groins, and these continued until they had reached the present size; the man denied any sign of rupture previous to the accident."

In at least the fifth case of Mock's series—enormous double oblique inguinal hernias—it would seem almost certain that there must have been present congenital sacs

or, rather, an early stage of hernia on both sides prior to the accident, and the enormous increase in intra-abdominal pressure in this case further developed the preëxisting condition. Mock himself admits that, "It is quite evident that, even in those cases of inguinal hernia following direct violence, some doubt will always exist as to the possible presence of a congenital predisposition for hernia." He very truly affirms that "Industrial commissions all over the country are depending on the surgeons in industry to arrive at a just and equitable decision concerning this subject of compensable hernia."

Mock believes that, "The first essential is to make a careful physical examination of all employees and to record those who have real or potential hernias. Whenever a hernia develops in one of these employees, who was recorded not to have a hernia, a careful analysis of his case must be made to determine: (1) Was it entirely due to preëxisting defect? (2) Was it entirely due to some severe direct or indirect violence? (3) Was a latent condition already present and only aggravated by the unnatural occupational hazard? (4) Was it due entirely to natural causes? (5) Or was it due to a combination of all of these and, if so, which was the most responsible?"

Mock admits that, "The great majority of hernias develop slowly, 'the gradual dilatation of a preformed case.' The congenital defect or predisposition is the chief cause for such hernias and the relation of natural occupation or of the natural acts of ordinary life are immaterial in their formation. These correspond to the gradual development of 'flat-foot,' a result of faulty shoes, constant standing and walking or other natural causes; or to the development of tuberculosis in employees engaged in occupations which in nowise predispose to this condition."

MacCready, the greatest English authority on hernia, states that an acquired hernia is never due to an accident or single increase of intra-abdominal pressure.

Graser, one of the highest German authorities, states that a hernia complete in all its parts can never arise at the moment of accident or by a single increase in the intra-abdominal tension, be it ever so great.

Moschcowitz, of New York, who made a very careful study of hernia in relation to the Workmen's Compensation Act,[1] concludes: "Traumatic hernia is exceedingly rare It may occur in any part of the abdomen, but usually *not* at the site of the normal hernia openings. Workmen's compensation commissions are not and cannot be acquainted with all the facts relating to hernia. This is evidently the sphere of the medical profession; the workmen's compensation commission should be required to place implicit reliance upon the decision of established medicine. In cases of appeal from the decision of the commission all the medical part of the testimony should be given by experts of the court's selection and not of the selection of the claimant or defendant."

A fact particularly emphasized by Dr. Hopkins is, that the great majority of hernias in industrial practice, particularly in railroad work, are found in foreigners, and nearly all in men who have not previously passed a physical examination. One of the reasons why they occur more frequently in foreigners is, we believe, the fact that the class of foreigners engaged in the lower grades of railroad labor are, as a rule, either undernourished at the time or went through a period of undernourishment during childhood, which tended to lessen the normal development of the abdominal wall. Another reason for the higher percentage of hernias in foreigners, particularly those coming from Russia and southern Europe, may be found in the practice so widely prevalent among these people of trying to produce artificial hernia in order to escape army duty. Dr. Gerster, of New York, called attention to this factor many years ago; and

[1] Med. Record., April, 1915.

recently, at the Hospital for Ruptured and Crippled, Dr. Hoguet observed a double direct hernia regarding which the man stated he had produced it himself. The method of production was: Taking a hard, slightly blunted stick, placing it over the inguinal canal and then striking moderate blows from time to time with a mallet until the muscular structures in the neighborhood of the canal are torn or pushed to one side and finally a hernia develops. Here again we must observe that it does not occur as the result of a single blow or single injury: It is only the repeated blows with this more or less sharp instrument that finally produces such a weakness as to cause a direct hernia to follow.

Of all the attempts made by the different state commissions to solve this vexed problem of traumatic or industrial hernia the industrial commissions of Nevada and California stand out as most in accord with our present knowledge of the causes of hernia.

The following is a ruling of the California Industrial Commission: "The consensus of medical and surgical opinion runs to the effect that hernia is very rarely, in any proper sense, the result of an accidental injury; that the accident is at best no more than the occasion instead of the cause of the malady; that the origin of the difficulty is congenital and more in the nature of a disease than an injury; that every claim for compensation based upon an alleged rupture is to be viewed with suspicion."

The Nevada commission rules: "Medical science teaches now what it has taught for the past twenty years, and is now accepted as a medical and scientific truth, corroborated as such by the foremost surgeons and anatomists in the world; that is, that hernia, or so-called rupture, is a disease, ordinarily developing gradually, and is very rarely the result of an accident."

The following rules have been promulgated by the Nevada commission: (Rule I) "Real traumatic hernia is an injury

to the abdominal wall (belly wall) of sufficient severity to puncture or tear asunder said wall and permit the exposure of protrusion of the abdominal viscera or some part thereof. Such injury will be compensated as temporary total disability and as partial permanent disability, depending upon the injured individual's earning capacity." (Rule II) "All other hernias, whenever occurring or discovered and whatsoever the cause, except as under Rule I, are considered to be diseases causing incapacitating conditions or permanent partial disability, and the cause of such are considered, as shown by medical facts, to have either existed from birth, to have been years in formation, or both, and are not compensatory except as provided under Rule III. (Rule III) "All cases coming under Rule II, in which it can be conclusively proved, (1) that the immediate cause which calls attention to the presence of the hernia was sudden effort or severe strain or blow, received while in the course of employment; (2) that the descent of the hernia occurred immediately following the cause; (3) that the cause was accompanied or immediately followed by severe pain in the hernial region; (4) that the above-mentioned facts were of such severity that they were noticed by the claimant and communicated immediately to one or more persons—are considered to be aggravations of previous ailments or diseases and will be compensated as such for time or loss only, depending on the nature of the proof submitted and the result of the local medical examination."

Our committee is entirely in accord with Rules I and II of the Nevada Commission. It, however, calls attention to a serious conflict in Rule III of the second proof which must be given in order to establish a right for certain compensation. Rule II, states specificially that by medical facts it is shown that a hernia either exists from birth or is years in formation; whereas, in the second proof of Rule III it speaks of a descent of hernia occurring immediately following a strain or blow. This assumes that hernia may be

the result of a single increase of abdominal pressure, which the commission in Rule II, stated to be impossible.

Many writers state that a recent hernia is tender and painful on manipulation, and ecchymosis is not infrequently present. This statement is frequently found in text-books, and particularly in articles upon traumatic hernia. We believe it has no basis in fact. In an experience of thirty-one years at the Hospital for Ruptured and Crippled, where we have an average of 5000 new cases a year, there has not been a single case of recent hernia which was "tender, painful, and accompanied by ecchymosis" in which there had been a history of antecedent injury or accident of any form. We have seen a number of cases that were attributed to an injury, and we are of the opinion that the patients honestly believed that the injury was the cause of the hernia; yet the size of the hernial ring, the thickness of the sac, with adhesions to the surrounding structures, all proved beyond the shadow of a doubt that the hernia was of long standing, although probably not previously recognized by the patient. A recent case, only observed in October, 1921, is a very good illustration of this point: A man, aged twenty-five years, an employee of the New York Central Railroad Company, with a history of never having had any swelling whatever in the region of the hernial canals, shortly after heavy lifting noticed a swelling in the right inguinal region. He came to the Emergency Hospital of the N. Y. C. R. R. Co., where the attending surgeon found a well-marked inguinal hernia the size of a small egg in the right inguinal region, extending well into the canal and upper scrotum. In the opinion of the surgeon this was one of the most definite cases in his experience pointing to a causal relationship between the strain and the hernia, and it might have been so regarded had not the patient consented to an operation. On October 14, 1921, Dr. Coley operated and found a preformed sac undoubtedly of congenital origin, extending well into the upper scrotum, $2\frac{1}{2}$ inches long and 2 inches

broad, considerably thickened, and firmly adherent to the overlying cremaster muscle. The nature of the sac clearly proved it to be of congenital origin, and in all probability the hernia itself had existed for months or possibly years, although the patient may never have recognized it until the time of the unusual strain, when a somewhat larger amount of omentum or bowel was forced into the sac, causing slight pain which first called his attention to the hernia.

Hernia is practically always due, first, to the presence of a preformed sac or open pouch of peritoneum which, in the inguinal variety, follows the testis in its descent into the scrotum, which pouch has failed to close in the normal way; and second, to the presence of structural weakness in the neighborhood of the hernial orifices due to poorly developed muscles or fascia. Given these all-important anatomical causes, which are in themselves sufficient in many cases to constitute a potential hernia, the actual hernia may develop by reason of a great variety of exciting causes; among these may be mentioned the daily increase in intra-abdominal pressure incident to the ordinary routine of life, *e. g.*, straining at stool, coughing, sneezing, lifting, etc. The main point that cannot be emphasized too strongly is that the hernia is never the result of a single strain or single increase in intra-abdominal pressure due to any of the causes mentioned; on the other hand, it is the cumulative effect of a great number of strains spread over a considerable period of time. In nearly all cases hernia is of gradual onset, is rarely accompanied by pain, and most frequently remains unnoticed until it has reached a considerable size or until some accident or strain, by slightly increasing the contents of the hernia sac, causes it to be noticed for the first time. Hence, the accident or strain is usually the occasion which first attracts the attention to a hernia along present but hitherto undiscovered. It has been a matter of almost daily observation

at the Hospital for Ruptured and Crippled to find a patient applying for a truss or for operation for a hernia on one side, when careful examination discloses the fact that he has a hernia on the other side almost if not as large as the one for which he applied for treatment. The size of the hernia and the character of the sac, as determined by operation, prove beyond question that this hernia existed for a long period and was quite unrecognized by the patient. Hence it is true that, in many cases, a person who states that his hernia is due to an accident or injury may sincerely believe this is to be the fact, because he was unaware of the presence of a swelling prior to the accident, although it had really existed for months or years before. In many cases, however, the contrary is true and a claim for indemnity or large damages is made upon a corporation for a hernia which the claimant well knew had existed for a long period prior to the accident. In some cases, evidence of his having worn a truss for a long period of time is apparent. We have seen many cases of this type in our medico-legal work and in some instances the sympathetic jury has awarded very large damages. In all of our experiences we have never seen a single case in which there was any sound basis for the claim that the accident or injury was the cause of the hernia. In many cases the jury has been convinced by expert testimony that a hernia could not have been caused by the accident mentioned and have rendered a verdict accordingly; but on the other hand, in other cases, all of the expert evidence has been brushed aside and the jury has allowed its sympathy for the claimant to outweigh the seemingly slight loss of a few thousand dollars' compensation to the supposedly wealthy corporation. One case which we recall is that of a man of about fifty years of age, who claimed to have been thrown forward against the back of the seat in front of him in a slight collision. The slight increase in intra-abdominal pressure was made the basis for his claim that a large double inguinal hernia

was the result of the accident, although there was no evidence of local injury at the site of either hernia. In spite of expert evidence to prove the fact that a double hernia is never the result of trauma, that these hernias were both too large to have been of recent origin, the jury awarded very large damages ($15,000). However, the verdict was so palpably against the evidence that the decision was reversed by the Supreme Court.

At present the situation in regard to dealing with the question of traumatic or industrial hernia may be described as chaotic. There are, however, a few states in which the members of the Workmen's Compensation Commission apparently have made a scientific study of the subject before formulating any rules, and in these states the subject is treated in a most fairminded and judicial way; in other states however, the rulings are apparently based on the old and long-discarded ideas as to the etiology of hernia with the result of great financial loss to the interested corporations and in the end distinct harm to the individuals.

What then is the remedy? The only thing needed to bring about greater harmony in the procedure of industrial commissions is to spread broadcast a clearer knowledge of the well-known medical and surgical facts relating to the etiology of hernia. We must recognize that medical and surgical truths permeate but slowly, specially when they have to overcome long-established traditions too often supported by court decisions. The first is to convince the commissions and the courts of the well-known established surgical fact that hernia is a disease and not the result of an accident. When this has been done a radical review of the present state laws regarding compensation in cases of industrial hernia will be forthcoming.

Recommendations. 1. Render proper compensation for all cases of true traumatic hernia due to direct violence. Such cases are so few in number as to be practically negligible.

2. Make a physical examination of all applicants for

positions in industry, no matter in what capacity. Such examinations will determine the fact whether or not a hernia was present at the time of examination.

Dr. Hopkins, in a recent paper on traumatic hernia reveals the important fact that of all the men who passed the physical examination prior to entering the railroad service the claim of traumatic hernia accounted to less than 1 per cent; while on the other hand, 99 per cent of the cases of alleged traumatic hernia were found to occur in foreigners (Greeks, Italians and Poles) who did not have a preliminary physical examination before being admitted to the service.

3. Any case of hernia developing in the course of duty, incident to the man's daily work, should be treated as a disease due to special anatomical weakness on the part of the individual for which the company is in no way responsible. If it is considered wise, under certain circumstances, to recognize any moral responsibility, let it be on an economic or humane basis. This moral obligation should be understood to be strictly limited to such employees as had been found apparently free from hernia at the time of previous physical examination.

Bibliography

Berger: Rev. de Chir., 1906, Nos. 4 and 5.

Kocher: Cor.-Bl. f. schweiz. Aerzte, 1898, p. 28.

Von Hassel and Walravens: Jour. de Chir., Bruxelles, 1903, p. 126.

Forgue and Jeanbrau: Accidents du Travail, Paris, 1905.

Berger: Traité de Chirurgie (Masson et Cie), Duplay et Reclus, vol. vi.

Kingdon: Med. Chir. Trans., 1864, p. 296.

Murray: Lancet, April, 1907.

Roberts: New York Med. Jour., 1904, lxxx, 631.

Hamilton Russell: Lancet, 1904, p. 707; ibid., 1907.

Blasius: Verhandl. d. deutsch. Gesellsch. Naturf. u. Aerzte, 1895, vol. lxvi.

Stuki: Cor.-Bl. f. schweiz. Aerzte, 1899, p. 589.

Sultan: Abdominal Hernia, Saunders (Coley and Satterwhite, Int. Jour. Surg., February, 1904).

Gallaudet: Med. and Surg. Reports of Bellevue Hosp., 1904, vol. i.

Hernie Considérée Comme Accident des Travail, Jour. de méd. de Paris, 1907, 2s., xix, 53.

Lucas-Championnière: Jour. de Mèd. de Chir. Prat., 1906, lxxvii, p. 6.

Reclus: Clinique Paris, 1907, li, 249.

Butte: New York Med. Jour., October, 1907.

Cutten Witthaus and Becker's Medical Jurisprudence, Forensic Med. and Toxicol., 1907, p. 853.

Daget: La Hernie est-elle accident du travail? Thèses de Paris, 1905.

Graser: Handbook of Pract. Surg., 1900 xx, 826.

Hopkins: Int. Jour. Surg., January, 1921.

Lotheissen: Arch. f. Orthop. Mechanotherap. u. Unfallchirurg., 1906, vol. lv.

MacCready: A Treatise on Ruptures (Blakiston).

Mock: Industrial Medicine and Surgery (Saunders).

Moschcowitz: Med. Record, April, 1915.

Sellenings: New York Med. Jour., April, 1920, p. 713.

Sheen: Practitioner, London, 1909.

Duchamp: La hernie au point de vue médicolégale, Loire médic, St. Etienne, 1900, p. 258.

Gaz. méd. de Paris, 1901, p. 170.

Jacquet: Echo méd. du Nord., 1900, p. 500.

Janin: Thèses de Paris, 1902.

Loriot: Thèses de Paris, 1902.

De Quervain: De la hernie de force, Semaine méd., 1900, p. 87.

Socin: Cor.-Bl. f. schweiz. Aerzte, Bezel, 1887, p. 545.

Sole: Jour. de méd. de Paris, 1904, p. 27.

Coley: Int. Jour. Surg., February, 1908.

Ibid.: February, 1904.

THE VALUE OF THE PNEUMOPERITONEAL *X*-RAY IN OBSTETRICS AND GYNECOLOGY BASED UPON AN EXPERIENCE OF OVER 300 CASES

By Reuben Peterson, M.D.
Ann Arbor, Mich.

Roentgenographic examination of the female pelvic organs after gas inflation has been rather extensively employed during the past eighteen months in the clinic of obstetrics and gynecology of the University of Michigan Hospital. Previous reports on this comparatively new diagnostic method purposely dwelt upon the technic of the procedure as it has been developed in this clinic. It was felt that, first of all, it must be determined whether transuterine and transabdominal gas inflation under proper aseptic technic is attended by dangers serious enough or so unavoidable as to preclude gas inflation as a justifiable or practical diagnostic method in obstetrics and gynecology.

As case after case was added to the list under the technic employed without the slightest peritoneal irritation resulting, it was felt that the safety of the method had been established beyond the shadow of a doubt. Naturally the next question to be answered, as clinical material has accumulated, is the value of gas inflation as a diagnostic procedure. In what proportion of cases is it of real value in establishing or confirming the preoperative diagnosis? In short, is this new procedure a fad and therefore transitory, or is it a valuable aid to pelvic diagnosis, not to be depended on alone but as a help in making the diagnosis of pelvic con-

ditions more accurate, so that the physician is in a better position in a given case to decide upon the line of treatment to be employed? It is to answer these and other interesting questions connected with gas inflation that the present attempt has been made to draw conclusions from certain groups of the 325 patients who have been inflated for various reasons from July 1, 1920, to December 1, 1921.

Obviously since the only way of determining the correctness of diagnosis arrived at by bimanual examination and the *x*-ray is by direct palpation through an abdominal incision only those patients operated upon after gas inflation can be considered. Of the 325 patients subjected to the pneumoperitoneal *x*-ray, 152 were operated upon through the abdomen. In 14 cases, for one reason or another, excessive or uncontrollable moving of the patients, too little gas in adipose patients, etc., the *x*-ray picture from a technical standpoint was so poor as to be worthless. There remain 138 cases where the clinical and *x*-ray diagnosis were carefully made and recorded prior to operation.

Before judging the value of the pneumoperitoneal *x*-ray as an aid to preoperative pelvic diagnosis it will be well to state just how these roentgen diagnoses were made and to set forth the criteria adopted in arriving at decisions as to whether the diagnoses were correct or otherwise. As has been explained at some length, in previous communications, the rule of the clinic has been to use the transuterine gas inflation route wherever possible. It was felt that, aside from the question of sterility, it was of the greatest practical interest in every pelvic case to be able to state definitely whether the Fallopian tubes were or were not permeable. However, no chances are taken to determine this fact. Whenever there is a history of acute pelvic infection, or in the presence of a bloody or purulent uterine discharge, the transuterine route is decided against and the patient is inflated by the transabdominal route.

To show the conservatism of the clinic in this regard, out of the 138 operative cases after gas inflation, the gas was introduced 73 times through the abdomen as an elective procedure. In 43 cases the gas was passed through the uterus and tubes in quantities sufficient for *x*-ray purposes. In 22 cases the transuterine route failed and the gas was injected through the abdominal wall.

The routine of gas inflation is as follows: A careful history is taken of each patient. There have been no exceptions to this rule, since the determination of the route for gas inflation depends largely upon such history. Whenever there is a history of acute or subacute pelvic inflammation, since it is the rule not to subject such patients to transuterine gas inflation, it is carefully considered whether such a case is suitable for even transabdominal gas inflation. If the pelvic inflammation be acute it is deemed a case unsuited for any form of inflation. If it be one of subacute pelvic inflammation, if there be no rise of temperature or pulse rate after a bimanual examination, transabdominal gas inflation is resorted to in the large majority of cases.

While it is not believed there is any particular danger of forcing the contents of the Fallopian tubes into the pelvic cavity by gas inflation under moderate pressure, to be on the safe side, as before stated, transuterine inflation is ruled out in the presence of profuse purulent uterine discharges and when there is a hemorrhagic discharge from the external os.

No patients with serious circulatory changes have been inflated. Even when moderate amounts of gas are introduced into the abdominal cavity it can readily be seen that the sudden rearrangement of the abdominal organs resulting from the gas inflation, together with upward pressure on the diaphragm, might very well embarrass a diseased and badly acting heart and possibly give rise to alarming symptoms if not lead to fatal results. For the

same reason, great care has been taken not to use gas inflation in the presence of large uterine or ovarian tumors. Not only might the presence of the gas produce the symptoms just referred to, but in reality there is very little to be learned from the pneumoperitoneal *x*-ray under such conditions.

The greatest care is used in the presence of suspected bowel adhesions to the abdominal wall. Either a site reasonably certain to be free from such adhesions is selected for the abdominal puncture or the case is deemed unsuitable for transabdominal gas inflation. In short, every case is critically gone over, pro and con, prior to gas inflation, and if there be any doubt the procedure is decided against and the patient operated without the inflation.

At the beginning of our work with the pneumoperitoneal *x*-ray, my colleague, Dr. Van Zwaluwenburg, and I agreed that we would work out our diagnoses independently. This arrangement was entered into deliberately, since neither the clinician nor the roentgenologist desired to be influenced by the other's opinion so far as diagnosis was concerned. This was hardly fair to either party, but was particularly unfair to the roentgenologist, who without the specialist's knowledge of pelvic pathology attempted to interpret what he saw on the *x*-ray film. As will be shown later, in reviewing the roentgen diagnosis, it was remarkable in what proportion of cases, as shown by subsequent operation, correct diagnoses were made by Dr. Van Zwaluwenburg, working in practically a new field and with no knowledge of the clinical histories of the cases.

The details of vagino- and rectoabdominal examinations without anesthesia were carefully recorded and the tentative diagnosis made in each of the 138 cases subsequently operated upon. An attempt was made to have these preoperative diagnoses very accurate. For instance, the size, position and movability of the uterus were recorded. The same was done with the appendages. If for any reason

it was impossible to palpate either ovary or tube it was so stated, and the same with adhesions. Such indefinite terms as "pelvic inflammatory," "tubal masses," "thickened broad ligament," etc., were discarded in favor of accurate findings and diagnosis.

The *x*-ray report was sent to the departmental office and studied in connection with the recorded physical findings in a given case. It was then decided whether or not the case called for operation. If the case were operative, the patient was always carefully examined under anesthesia and these findings recorded. This is only where accurate determination of the pelvic contents is being attempted, since in so many instances, in a certain class of patients, rigid abdominal walls prevent satisfactory pelvic examination. However, it is well to bear in mind that the *x*-ray report was not allowed to influence the examination under anesthesia so far as the findings were concerned. If an ovary or tube could not be felt, or if it were determined no adhesions existed, it was so recorded.

In order to compare the clinical with the *x*-ray diagnosis the most difficult class of cases from the diagnostic standpoint has been selected for comparative study. Of the 138 operated cases there were 54 of salpingitis with adhesions, and these have been carefully analyzed. It must be borne in mind that, in stating that diagnosis is difficult in this particular disease of the pelvis, the word is not used in its ordinary sense. Clinically it is not at all difficult to determine whether or not a patient has salpingitis or probably has the condition. Specially is this true in severe types of the disease where the uterus is immovable or its movability impaired, where there is distinct inflammatory thickening at one or the other side of the uterus. Minor degrees of tubal enlargement with or without adhesions may or may not be felt by the examining finger. From experience with hundreds of cases verified by subsequent laparotomy the gynecologist may judge that the tube and

possibly ovary are affected, but in many cases the examining finger is absolutely unable to outline these organs, which are backward in the pelvis and to one side and covered with plastic lymph. In quite a percentage of cases such a condition exists in one side while the tube is enlarged and adherent and easily palpated in the other.

So difficult has been the differentiation of the appendages, or portions of the appendages, in certain types of inflammatory disease of the pelvis that in many instances it is not attempted at all, but accurate diagnosis is reserved until the pelvic contents can be palpated through the abdominal incision. Now it cannot be denied that such a course is one of intellectual cowardice. It is dodging the question of preoperative diagnosis because of attendant difficulties which the gynecologist should strive to overcome if possible.

The clinical diagnosis in relation to the 54 cases of tubal disease relates to this more accurate preoperative diagnosis and should be considered in this connection, otherwise it would be inexcusable for the specialist to fail to make a diagnosis in such a large percentage of the cases. In other words, failure does not mean that the clinician did not know he was dealing with pelvic inflammation, but that he failed in part to state definitely what organs were affected by the inflammatory process.

In 54 cases of salpingitis with or without adhesions, in the sense defined above, the clinical diagnosis was correct 33 times, or 61 per cent of the cases. In 17 cases it was partially correct, and in 4 cases it was incorrect in that no inflammatory tubal disease was found prior to the operation. Turning to the *x*-ray diagnostic side of the question, it was found that, in the type of pelvic disease under consideration, tubal disease was correctly diagnosticated 24 times, or in 44 per cent of the cases. In 21 cases out of the 54 patients with salpingitis, or 39 per cent, the *x*-ray disgnosis was partially correct; while in 9 cases, or 17 per cent, it was incorrect.

This, it seems to me, all things taken into consideration, is a very creditable showing for this new aid to pelvic diagnosis, and holds out great hope for greater accuracy in the future, since these statistics were made up from all operated cases of salpingitis with adhesions when the roentgenologist had to feel his way in making a diagnosis. Again great improvement in diagnosis may be expected from now on, since the future plan of the two departments will be to furnish all factors in the cases before the final diagnoses are made prior to operation. For example, the clinician provided with the history of the case, plus the bimanual findings, goes over the film with his *x*-ray colleague and aids in the interpretation. In one instance he will point out that there is no history of inflammatory pelvic disease and that the shadow seen low down in the pelvis is probably a cystic ovary and not salpingitis with adhesions. Again, that the uterus which is enlarged and backward probably is not due to pregnancy since no menstrual period has been missed.

It is well to call attention to the fact that even as the *x*-ray diagnosis has improved, and will still further improve with added experience, the clinical diagnosis, even under the rigid conditions laid down for correctness in diagnosis, has improved nearly 10 per cent in the last 20 cases under analysis. This demonstrates how valuable is the pneumoperitoneal *x*-ray, in that a study of the films in conjunction with careful bimanual examinations leads to better interpretation of the next case by the examining finger.

It may be urged that such refinements of diagnosis are hardly necessary, since an abdominal incision will clear up all doubts. A little consideration will show this reasoning to be faulty and specially unfair to the patient. An exploratory laparotomy may be comparatively free from danger but not entirely so. The physician is in duty bound to save his patient from unnecessary pain, anxiety and expense, and thus should welcome any additional aid to diagnosis.

The well-known fact that in a certain percentage of cases the ordinary methods of pelvic examination fail to reveal certain types of pelvic pathology, causes the examiner to hesitate and take the easiest course, exploratory laparotomy, in the presence of pain or other lower abdominal symptoms—this even when he can find nothing and really feels there is nothing pathologic in the pelvis. If his negative pelvic findings be supported by a pneumoperitoneal *x*-ray picture showing normal pelvic contents, he will refrain from a useless exploratory operation and seek another explanation for the existing symptoms.

At least this is the trend of our practice in the clinic since the advent of the pelvic *x*-ray. In fact, it has been found that this new method of diagnosis has been of the utmost service in doubtful cases, where something is felt by bimanual examination but not enough to make one positive as to diagnosis; where nothing or practically nothing is palpated, but the *x*-ray shows distinct pathology; in short, in those cases where one would gladly palpate through an abdominal incision in order to arrive at a correct diagnosis. The pelvic *x*-ray plus the careful bimanual examination is the next best thing to this direct palpation, and in time with added experience may be almost as effective.

A case illustrative of what is meant is being investigated as this paper is written: A young woman of twenty-one, healthy—in fact, an athlete—has noticed for the past year something wrong low down in the right side. She has never had a vaginal discharge nor abdominal pain and fever. Examination shows an unruptured hymen, no signs of infection, a normal-sized uterus in good position but of somewhat limited mobility. The left ovary is of normal size, slightly movable, tube not palpable. In the region of the right tube and ovary, and behind in the cul-de-sac to the right of the median line, is an irregular, adherent mass not particularly sensitive and not well definable on account of the rigidity of the abdominal walls.

Formerly this patient would have been informed that she had a pelvic mass, that she should be operated upon and that the exact diagnosis would be made after the abdominal incison had been made. This in spite of the fact that this particular patient, because of the probability of marriage in the near future, has every reason to demand that the condition of her pelvic organs and the extent of the operation be told her prior to the abdominal incision.

In this particular case the pneumoperitoneal *x*-ray showed the irregular mass on the right, adherent to intestinal coils, presumably the tube and ovary, since these organs gave no shadow. The left ovary and tube were enlarged and adherent. The *x*-ray diagnosis was bilateral salpingitis, more marked on the right side.

The patient has been informed that she has trouble with both appendages, more marked on the right; that she may and probably will have to sacrifice the right tube and ovary, but that part of the left probably can be saved. While all the facts in this particular case have not been ascertained by clinical and *x*-ray diagnostic methods, for there is no history of pelvic infection (further borne out by the unruptured hymen), the condition of the appendages is well enough known to permit an intelligent discussion of the case with the patient prior to operation.

The pneumoperitoneal *x*-ray has been extremely valuable as an aid to diagnosis in early cases of pregnancy—from the sixth to the ninth or tenth week. In these early weeks of pregnancy the expert examiner may detect enlargement and softening of the uterus, but he is very loath to say more than that he suspects pregnancy or that the condition is very suspicious of pregnancy. Specially is this true if skipping of the period is admitted. His suspicions are made quite positive if the pneumoperitoneal *x*-ray shows an enlarged uterus and isthmus. In 8 cases of pregnancy from the sixth to the tenth week the condition was positively diagnosticated by the *x*-ray without knowledge of the

history or the vaginal examination findings. In each instance the diagnosis was confirmed by the subsequent history.

The *x*-ray picture of early pregnancy shows almost uniformly an enlargement of the isthmus, the cross-section of the uterus, at a point corresponding with the lower uterine segment. Not only is the isthmus enlarged in the long axis of the uterus, but it is shown to stretch out on the sides toward the broad ligaments. In pregnancy advanced more than ten weeks this thickening of the isthmus is very marked, so that beyond the tenth week pregnancy can invariably be recognized by the pneumoperitoneal film at a time long before the fetal bones can be demonstrated. This diagnostic sign is specially valuable in cases of fibroids complicated by pregnancy. Again, the absence of the sign is valuable in demonstrating the nonpregnant uterus, when menstruation ceases at the menopause, giving rise to great mental disturbance in patients who have been exposed to and fear pregnancy.

Time does not permit a description of other pelvic conditions, such as fibroids with and without diseased appendages, small pelvic growths, unruptured ectopic pregnancies, etc., in which the pneumoperitoneal *x*-ray has proved invaluable as an aid to diagnosis. It is realized that this work is just beginning and that interpretation of such films will improve as they are numbered by the thousands instead of by the hundreds. Even so, at the present stage of the study the pneumoperitoneal *x*-ray has become an invaluable aid in the clinic and would be dispensed with only with the greatest reluctance. This aside from the indispensable aid of pneumoperitoneum itself in determining the patency or nonpatency of the Fallopian tubes in cases of suspected or actual sterility. However, this is another subject and will be left for subsequent discussion.

ANOTHER CASE OF BULLET WOUND OF THE FEMORAL ARTERY AND VEIN SUCCESSFULLY TREATED BY LIGATION OF THE ARTERY AND VEIN AND EXTIRPATION OF THE INJURED SEGMENT

By G. Paul LaRoque, M.D.
Richmond, Va.

Before this Association, last year, I reported a case of communicating bullet wound of the external iliac artery and vein cured by ligation of these vessels and partial extirpation of the injured segments. This report, with a study in some detail of the subject of bloodvessel injuries, was published in the *Annals of Surgery*, March, 1921. The patient's limb at the present time is in every way normal save that no pulsation of any vessel is palpable below the point of ligation.

The present case report is of a similar injury, slightly lower down, of the femoral vessels, and, though both vessels were injured by the bullet, clot formation had occurred and closed the fistulous communication between the artery and vein. The case was treated by similar ligation of the femoral artery and vein above and below the site of injury and complete excision of the injured segment, involving slightly more than an inch of each vessel. The result is perfect. There is no evidence of ischemia of the limb; the function of the entire lower extremity is unimpaired, and—but for the absence of pulsation of the popliteal vessels and those of the ankle and foot and the presence of the scar at the

site of operation—there is no evidence that the limb has ever been injured or operated upon.

CASE No. 21-3780. Colored woman, about twenty-five years of age, admitted to St. Philip Hospital, September 27, 1921, about 2.15 P.M., having received a pistol bullet wound half an hour before admission. The wound of entrance was in the upper part of the right thigh, two or three inches below and slightly external to the anterior-superior spine of the ileum. There was a wound of exit on the left labium; another one of entrance into the adjacent portion of the left thigh, and a final wound of exit in the outer aspect of the left thigh two or three inches below the left anteriorsuperior iliac spine. The wound of entrance in the right thigh was oozing blood. The other wounds were not bleeding. There was some swelling in the right thigh: It measuring twenty-one and a half inches in circumference, as compared with eighteen and one-half of the left at the level of the vulva.

All four extremities were cold. Upon admission, no pulse was palpable in either foot, nor in the right popliteal artery, though the left popliteal was palpable. An hour later, pulsation of the anterior tibial and dorsalis pedis arteries were easily palpable in the left extremity, but not in the right. Capillary response in the nails of the left toes was normal, while in the right it was slow and subnormal. Needle puncture of the left great toe gave prompt and free bleeding of red blood, while from the right the bleeding was slow, scanty and the blood blue. The superficial veins of the right foot and ankle were slightly distended. The patient complained of great pain in the entire right extremity, most severe below the knee. The toes and foot were freely movable. There were no abdominal symptoms. The bladder was catheterized and there was no evidence of injury to the urethra or bladder. Palpation failed to find any injury of the vagina or rectum.

After five hours there was some subsidence of pain, but still no palpable pulse in the right foot, ankle or popliteal space. There was no thrill nor bruit in the region of the femoral vessels nor in any part of the extremity.

Six hours after receiving the injury an oblique incision was made through a clean field (surgical approach) in the upper part of the thigh an inch or so below Poupart's ligament. A small amount of clotted blood was found in the region of the tract made by the bullet. The internal saphenous vein, in the field of operation, was doubly ligated and cut. Fat, lymph nodes and devitalized tissue were excised. The common femoral artery was easily identified. The wounds on the sides of the vessel were easily seen and occupied by a clot. This was just below the origin of the profunda femoris branch. Pulsation of the common femoral was noticed in the part of the artery just above the profunda branch, but there was no pulsation of the profunda nor in any part of the femoral below the point of injury. The artery below the wound was greatly reduced in size. The common femoral artery was held up on an aneurysm needle to have the bleeding under complete control and the clot was removed from the vessel; free bleeding occurred immediately and it was noted that the profunda also pulsated after removal of the clot. The superficial femoral was clamped just below the profunda branch and well below the bullet wound. The injured segment (about an inch) was excised intact. Both ends of the femoral artery were ligated.

Up to this time we had not recognized the wound of the vein. From a study of the subject, last year, we believed, however, that the companion vein should be ligated whether injured or not in a case necessitating ligation of a large artery. Upon examination of the vein it was found that this vessel was also injured and contained a large clot. After removing the clot and clamping the vessel above and below the injury, about an inch of the femoral vein was removed.

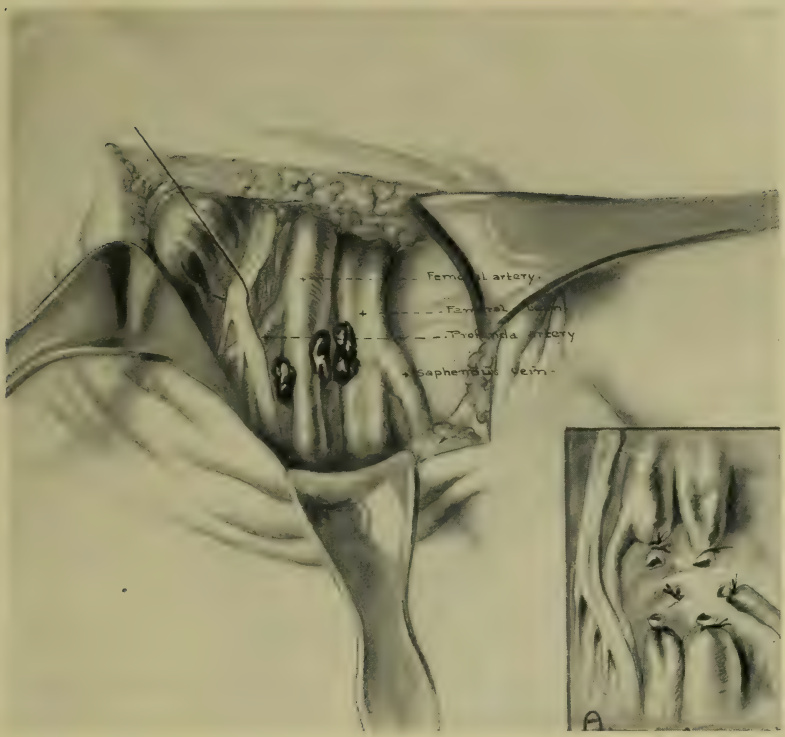


FIG. 1.—Bullet wound of the femoral artery and vein. Insert shows the appearance after ligation of vessels and extirpation of the injured segment.

When this was done there was seen to be a bleeding vein underneath the femoral (evidently a communicating vein), and this was tied. After trimming away the ragged, devitalized tissue in the neighborhood, removing blood-clots, tying small bleeders, getting the wound completely dry, the skin wound was sutured completely without drainage. The other skin wounds of exit and entrance of the bullet were excised and sutured, the patient placed in bed and the right extremity surrounded with abundant external heat.

Convalescence was normal until the fifth day. At this time she had fever of 102° and some swelling of the thigh. Just above the level of Poupart's ligament there was a soft and fluctuating area. The stitches were removed and there was no visible pus even from the suture holes. An aspirating needle was plunged into the soft swelling above the operation wound, and clear amber fluid, which we took to be lymph, was removed. This was thoroughly cultured in the bacteriological laboratories and found sterile. Swelling and fever persisted several days, and though I was never able to get any yellow pus nor a culture of bacteria, I am convinced there was slight wound infection.

The woman was kept in the hospital three weeks—at which time she was perfectly well, walking about and with no disability of any kind. Examination eleven weeks after operation found the extremity in every way normal except that I am unable to palpate any arterial pulse below the point of operation.

A distinguished American surgeon is quoted as having prayed to be delivered in time of illness from the care of a doctor who has had *a case*. Might he not with equal fervency pray to be delivered from the surgeon whose opinions are firmly fixed after the successful management of *another case?*

When one studies the broad principles involved in the treatment of the immediate and remote effects of injuries

of large bloodvessels, and the results of isolated cases treated in different ways throughout the world, one can scarcely escape the conviction that for lesions of the femoral vessels the proper treatment consists of aseptic excision of the wound and pathology and all this implies; in other words, through a clean surgical approach of ligation of the artery and vein above and below the injury and extirpation of the injured segment. The large number of cases of arteriovenous fistula and injuries successfully treated in this way and the monumental contributions of that great truth-finder, W. S. Halsted, leave little room for doubt that ligation of vessels and extirpation of the lesion, properly performed, should give complete and permanent cure and with no obvious circulatory disturbance.

NOTE.—During October, 1921, I saw Dr. Mont Reid, of Prof. Halsted's clinic at Johns Hopkins Hospital, perform exactly this operation upon two cases of arteriovenous fistula of the subclavian vessels—one of the right and the other of the left—and in both cases the results were perfect cure of the fistulæ and perfect circulation in the extremities. These cases, with many others involving other vessels, will soon be reported by Dr. Reid.

ANEURYSM OF THE INTERNAL CAROTID ARTERY IN ITS CERVICAL PORTION

REPORT OF A CASE

By Nathan Winslow, M.D.
Baltimore, Md.

(By Invitation)

Aneurysm of the extracranial portion of the internal carotid artery is a surgical curiosity. No further proof of its rarity need be sought than the scant consideration accorded it by the standard text-books of surgery. Agnew[1] writes: "When the cervical portion of the internal carotid becomes the seat of aneurysm, the case assumes the deepest interest from the obscurity which environs the swelling." So far as he could determine, but once (by Syme) had operation been done for its cure. Gross[4] casually mentions it as having occurred in a few instances. Bryant[2] ignores it entirely. The *American Text-book of Surgery*[3] is silent upon the subject. *The International Text-book of Surgery* disposes of it briefly. Johnson's *Operative Therapeusis*[5] alludes to it incidentally as having been observed. There are two outstanding contributions by American authors: One by Prewitt in the *Transactions of the American Surgical Association*, 1886, iv, 233; the other by Matas in Keen's *System of Surgery*, 1911, v, 323. The best article by a foreign contributor is Bobbio's. This appeared in *Il Policlinico*, 1906, xiii, sez. chir., 50. Therein are collected 18 cases.

My purpose in presenting this paper is to ensure a prompt

recognition of this obscure lesion when it does occur; to assemble all facts pertinent thereto; to render in abstract for the convenience of those interested in a further study of the condition the cases reported in the literature, and in particular to place on record a case that came under my care. The most important result of my investigation was the discovery that aneurysm in the cervical portion of the internal carotid is not as infrequent as heretofore supposed. On June 22, 1808, Sir Astley Cooper[6] ligated the common carotid for what he believed to be an aneurysm of the internal carotid and cured the patient. Inasmuch as the manifestation of this swelling was in the neck and not in the pharynx, it has been classed by some as an aneurysm of the common and not of the internal carotid. In justification thereof these writers assert that aneurysm of the internal carotid points in the throat, never in the neck, while the concrete evidence of aneurysm of the common carotid is always in the neck, never in the throat. Yet at operation and at autopsy instances of aneurysm of the internal carotid have been observed without a swelling in the throat (Porter, Moser). Ten years later, Dupuytren[7] operated upon a woman, aged fifty-six years, for an expansile and pulsating lump at the back of the mouth which was interfering with deglutition. After ligation of the common carotid the pulsation ceased, but the patient died of cerebral complications eight days after the operation. At autopsy an aneurysm of the internal carotid was found. It is recorded that the arterial walls were studded with lime salts. Slowly, sporadically and at irregular intervals the number placed on record has risen to 70. Of these, 37 were reported during the nineteenth century, 33 since. Including the case I will present later, 19 of the cases were observed by American surgeons.

Though seldom seen, the chief interest in this affection is not centered so much in its rarity as in the possibility

of its being mistaken for tonsillar abscess and lanced for a collection of pus with disastrous results. Lee[8] had the misfortune to incise a swelling of this character. A man aged twenty-eight years, who had been shot fifteen days previously, called at Dr. Lee's office with the complaint that he could not swallow and that the right side of his neck was stiff. Only with considerable effort could the patient open his mouth sufficiently wide for an inspection of the throat. The examination revealed a very much swollen soft palate and an indurated area on the hard palate which was taken for the bullet. With the intention of removing the missile, Lee made an incision into the mass. Instead of the bullet he encountered a quantity of clotted blood, during the process of removal of which—much to his surprise—he was greeted with a spurt of bright-red arterial blood. He immediately realized that he was confronted with an aneurysm, but all effort to control the escaping blood was prevented by the struggles of the patient, and the man died in a few minutes. At the autopsy, performed by Fenger, the source of the hemorrhage was found to be an aneurysm of the internal carotid artery. Duke[9] reported a similar accident. He had intended lancing a swelling in the region of the tonsil, but fortunately avoided the disaster by the introduction of a finger into the mouth of the patient, and desisted upon the discovery of pulsation. A consultant did not consider the condition so serious and incised the swelling. The life of the patient was temporarily preserved by the ligation of the common carotid artery, to be sacrificed five weeks subsequently by secondary hemorrhage. Chassaignac[10] fell into the same error, but happily saved his patient by operation.

The diagnosis is mainly between abscess, rarely malignancy, and is determined upon the same general principles that guide us elsewhere in differentiating these affections. In tumors seated deeply in the neck the history is of material

aid in avoiding error. Mudd, in Hulbert's case, obtained a history of a lump antedating a scarlatinal angina and was thus led to a correct diagnosis. Agnew emphasizes the ability of the physician to both see and feel pulsation. He fails to realize, however, the possibility of the patient being unable to open the mouth sufficiently for ocular inspection or to permit the passage of a finger. Pircher[11] was called to see a girl, aged eight years, for a swelling under the angle of the left jaw which prevented the patient from opening her mouth. He thought he was dealing with an abscess and attempted unsuccessfully to reach the seat of trouble by an incision in the neck. Several consultants concurred in the diagnosis and advised tapping of the abscess with a trocar. The suggestion was adopted, but again he failed to discover any pus. Much to his surprise the patient began to improve, and was apparently on the road to recovery, when one day without warning there was a fatal hemorrhage from the mouth. Autopsy revealed a ruptured aneurysm as the source of the bleeding.

Cases like the above are the exception. Generally the symptoms of extracranial aneurysm of the internal carotid are quite characteristic and not—as some observers would lead us to believe—obscure. There will be a tumor pushing the lateral pharyngeal wall into and obstructing the food passageway. It may extend to or even across the midline of the fauces. Unless the jaws are fixed the lump is accessible to sight and touch. It may be circumscribed or diffuse and is bulging and pulsatile. The swelling is soft and elastic to the touch and pulsates throughout its entire extent. Externally there may be no evidence of the disease or there may be a puffiness in the neck and occasionally a distinct tumor behind the angle of the jaw. If a stethoscope be placed over the lump a bruit is heard. With a finger in the mouth and another on the neck the tumor is felt to be expansible. Both murmur and pulsation dis-

appear when the common carotid is compressed, to recur immediately upon the removal of the compression. Arrest of the circulation causes a diminution in the size of the growth. Those afflicted with this malady often complain of an annoying roaring and buzzing in the ear, persistent and severe hemicrania, vertigo, weakness and other symptoms indicative of cerebral circulatory disturbance. Swallowing of solids is sometimes impossible and is usually accomplished with difficulty. Liquids may be regurgitated through the nose. Dyspnea is a not uncommon complaint. If the hypoglossal, glossopharyngeal or vagus be involved, the organs which it serves will be paralyzed. In doubtful cases the diagnosis has been made by the insertion of an aspirating needle into the sac and the drawing off of pure blood. Even in the presence of aneurysm the draw may be dry from the entanglement of the needle in or the plugging of its bore with clot. Instances of this sort have been cited and the method is only of value when blood is obtained. As diagnostic puncture leaves the sac wall weakened, it should be practised only when the patient is so situated that a prompt operation can be done in the event of a rupture through the path of the needle.

It is true, in general, that aneurysm of the internal carotid artery points in the throat and that of the common carotid points in the neck; but that this is not invariably the case has been fully substantiated in the operative clinic and necropsy room. Porter[12] verified by autopsy a case of aneurysm of the internal carotid without any signs within the pharynx. The postmortem was done seven years after the common carotid artery had been ligated for an aneurysmal tumor in the upper part of the neck. The report especially emphasized the absence of faucial tumor. Moser[13] also relates a somewhat similar case: A woman sought relief for a tumor in the right side of the neck which pulsated synchronously with the heart. Though nothing

abnormal could be seen within the throat, at operation an aneurysm was found springing from the internal carotid artery. Isolated observers, notably Dubrueil[14] and Helferich,[15] have specifically mentioned the absence of pulsation or fluctuation. Under such circumstances the aspirating syringe has given a clue to the true nature of the lesion. Dubrueil interpreted a case of this sort as an adenoma or sarcoma and attempted extirpation. During the process of the enucleation of the swelling the sac wall was inadvertently torn. The hemorrhage therefrom was arrested by a prompt ligation of the common carotid. Several hours later, the same day, he made a second ligation of the common carotid, and at the same time tied the external and internal carotids and the superior thyroid artery for a repetition of the bleeding. There was no further bleeding from the damaged sac, but the patient died on the fourteenth day of hemiplegia. At autopsy an aneurysm of the internal carotid artery was discovered. The same accident befell Helferich, but he was more fortunate in that he saved his patient by ligating the internal and common carotid arteries. In such cases as these, where the signs are lacking, obscure and atypical, extraordinary care must be employed to avoid mistakes in diagnosis and meddlesome surgery.

Inasmuch as the relief of this condition is so closely allied with carotid surgery, a brief review of the latter is not amiss: In 1803, Fleming[16] and Hebenstreit[17] independently and successfully ligated the common carotid artery for hemorrhage. In 1805, Sir Astley Cooper[18] tied the primary carotid for aneurysm, the patient succumbing on the twentieth day. He repeated the operation in 1808 with success. Gurdon Buck,[19] in 1848, occluded the internal carotid for a wound, and W. T. Briggs,[20] in 1871, with success, for a traumatic aneurysm. It remained, however, for Wyeth[21] to place carotid surgery upon a rational basis. In 1878, this astute surgeon attacked the prevailing

practice of ligating the common carotid for lesions of its branches. In lesions of the cervical portion of the internal carotid, aneurysm excepted, he urged ligation of this vessel above and below the seat of trouble on account of the liability of a recurrent flow through the circle of Willis, with bleeding to death if the cardiac side alone be ligated.

In aneurysm the operation of choice is ligation of the internal carotid between the sac and the common trunk, despite the possibility of a regurgitation through the cerebral vessels into the segment above the ligature, as the current of blood in this event seeps into a blind pocket and is too sluggish to cause trouble. Should the internal carotid be unavailable for ligation, better results are obtained by ligating both the common carotid and the external rather than the primitive carotid alone. If this plan be adopted the external carotid should be tied as close to its origin as possible. Otherwise any branches intervening should also be obliterated, else there is imminent danger of the formation of a collateral circulation across the neck, with the establishment of a retrograde current in the proximal section of the external carotid; thence the way is wide open to the internal carotid through the upper segment of the common carotid, and the object of the operation may be compromised. Failure to observe this precaution explains the reappearance of pulsation in the sac.

From the inception of carotid surgery the possibility of cerebral disturbances has invested a simple technical procedure with a gravity associated with but few operations. To avoid the evil results of a disturbed cerebral circulation, Halsted[22] advises temporary occlusion of the common carotid artery under local anesthesia before attempting obliteration of the diseased artery. Usually a defective circulation is indicated by the prompt appearance of dangerous symptoms. If untoward manifestations arise, the constricting band should be promptly removed. Matas[23]

says, in the light of this important suggestion, the entire surgical treatment of the carotid must be revised. In the future no one will be justified in planning a deliberate operation for the cure of aneurysm in this perilous location without first testing the efficiency of the collateral circulation.

According to the structures entering into its composition, aneurysm in this situation is either true or false. In the former, the sac wall is formed by one or more of the tunics of the artery; in the latter, condensed adventitious tissues constitute the wall of the aneurysm.

A better classification, perhaps, is that based on its causation, *i. e.*, (1) spontaneous, (2) erosive, (3) traumatic. The traumatic variety may involve the artery alone or the artery and accompanying vein. No matter what the type, they all give rise to practically the same symptoms and tend to present in the lateral wall of the pharynx.

The patient observed by me was a negress, married, aged forty-eight years, and by occupation a cook. She was admitted to the University Hospital, Baltimore, January 24, 1921, for a tumor of the throat of nine months' duration. There was nothing in either her family or personal history that had any bearing on the trouble. She denied luetic infection. In April, 1920, she noticed a right-sided tonsillar swelling for which she called in a local physician, who, mistaking the malady for a tonsillar abscess, made a stab which evacuated blood but no pus. Much to the woman's chagrin, instead of the lump decreasing in size it gradually grew larger, and finally so encroached on her fauces as to interfere with swallowing and materially to embarrass breathing. In addition, there developed in the right ear a most annoying roaring and with each cardiac impulse she felt as if her head would be jarred off her neck. She also complained bitterly of a rhythmical throbbing located

immediately behind the angle of the jaw, persistent and intense headache and muffling of speech.

Upon viewing the throat through the mouth, a mass was seen springing from the right lateral pharyngeal wall and impinging on the uvula. The food passage was but a narrow slit. The tumor was diffuse, smooth, elastic to the touch and pulsated throughout. It was located behind a rather small but otherwise healthy tonsil. A puncture scar on the anterior pillar was plainly visible. Upon compression of the common carotid, pulsation was arrested but returned immediately with the release of the pressure. There was a puffiness behind the angle of the jaw, but no distinct tumor could be detected. With a stethoscope over this area a bruit was plainly audible. By combined intra- and extrabuccal pressure the size of the swelling was perceptibly diminished. The examination was otherwise unproductive. The blood Wassermann was negative, as was also the blood chemistry. Roentgen ray of the cervical spine was without result. The bloodpressure was $\frac{130}{80}$. The clinical impression was aneurysm of the internal carotid in its cervical course, without assignable cause. As the condition was urgent operation was proposed and accepted.

On February 1, 1921, under ether, the three carotids were exposed in the triangle of election. Pinching of the external carotid had no effect upon the pulsation in the tumor, but squeezing of the main trunk or of the internal division arrested the throbbing in the swelling. A twisted silk ligature was then applied to the external carotid just above its origin and another to the primitive a little below its division with the idea of effectually cutting off all of the by-paths through which a collateral circulation might be established. With the tying of the common carotid all movement in the tumor ceased, never to reappear. The shutting off of the circulation had no effect at any time on the pulse, respiration or cerebral functions. Convalescence

was uneventful except for a transitory headache. There was no rise of temperature of moment, no dizziness, no vertigo, no paralysis. The patient was discharged February 9, 1921. At that time the lump was still in evidence. Ten months have elapsed since the operation, the mass in the pharynx has entirely disappeared, the roaring in the ear has gone, there is no more jarring of the head, the hemicrania has been relieved, no bruit is audible, no pulsation can be felt. The woman is enjoying very good health and has returned to her occupation of cook.

Were the time allotted sufficient, a detailed narration of the cases found by me in the literature would be neither suitable nor appropriate to this occasion. Those interested in a further pursuit of this study may consult the tables issued as an appendix to this article. The cases number 70. Of these 36 are spontaneous aneurysms, 10 erosive, 13 traumatic, 10 arteriovenous and 1 unclassified. The latter was found by Arnould (*Bull. et mém. de la Soc. Anat. de Paris*, 1914, lxxxix, 168) in a dissecting-room subject. 37 were males, 31 females, 2 not stated. In the spontaneous type 26 were females as against 9 males; in 1 the sex was not mentioned. Cure was attempted by operation in 48 instances, with 32 recoveries and 16 deaths: 30 were operated on since 1890, with 24 recoveries and 6 deaths; 18 previous to that time, with 8 cures and 10 fatalities; 21 were not operated on. Of these 16 perished, 1 made a spontaneous recovery (Lyot and Petit), and 4 were in the same or worse condition when the report was made. The causes of death as given in the 16 fatal unoperated cases were: Spontaneous rupture and hemorrhage into the mouth, 8; fell suddenly dead (no cause found at autopsy),1; anesthetic (chloroform), 1; hemorrhage from incision (mistaken diagnosis), 2; anthrax, 1; cerebral symptoms, 1; cerebral softening, 1; coma, 1.

The clinical course of the case found in the dissecting

room was not known. Puncture was done for abscess 5 times. Of these cases, 1 died immediately of uncontrollable hemorrhage, 1 three days later from a renewal of the bleeding. In the other 3 the common carotid artery was ligated immediately with the following results: 1 recovery and 2 deaths. Wagner[24] was spared a similar mistake by forgetting to take with him his instruments. Upon his return the next morning he was informed the patient during his absence had died of a hemorrhage into the mouth. The diagnosis was cleared up in 5 instances by the aspiration of pure blood. In 2 instances the condition was mistaken for sarcoma and during the attempt at extirpation the sac wall was torn. In both cases ligation of the carotids served to arrest the hemorrhage; 1 patient recovered, the other died fourteen days afterward of hemiplegia. Two patients died on the operating table, one of asphyxia from rupture of the sac into the fauces and inhalation of the escaping blood, the other from the effects of chloroform. Treatment by compression was attempted 3 times, twice it was supplanted by ligation; in the other case, Vander Veer[25] thought he had made a cure, but about three months later the man suddenly fell dead. McMullen and Stanton,[26] in their case, made a restorative aneurysmorrhaphy. The patient apparently convalesced nicely and had been discharged from the hospital, but was readmitted a few days later for a hematoma beneath the scar. The wound was reopened and the bleeding found to be from a rent in the sutured vessel. Attempts to clamp the artery failed on account of the friability of the tissues and the hemorrhage was only controlled with considerable difficulty by tamponing the wound. The patient lost so much blood that she died within a few hours of shock. LeFort[27] in a case of arteriovenous aneurysm incised the vein, sutured the hole in the artery transvenously and capped the suture line with a piece of the vein. Bruns,[28] Perthes,[29] Morestin[30] and Moser[31]

practised extirpation of the sac. Agnew, because of recurrence of pulsation in the swelling, ligated the opposite carotid, but the patient died about a week later of secondary rupture of the sac into the back of the mouth and sepsis. The common carotid alone was ligated 22 times with satisfactory results in 13 instances. The internal was ligated alone 4 times, with 3 recoveries and 1 death.

Conclusions: (1) Aneurysm of the internal carotid artery outside of the skull, though rare, is not as infrequent as supposed. (2) Before incising a unilateral lump in the neighborhood of the tonsil, specially if of long standing, look, feel, listen. (3) Spontaneous cure may occur, but the usual termination in untreated cases is rupture into the fauces. (4) The operation of choice is obliteration of the internal carotid proximal to the sac. If this be impossible, then ligation of the common carotid together with a ligation of the external carotid between its origin and first branch. All branches of the external carotid proximal to its site of ligation should also be tied. (5) The operative mortality is 20 per cent. (6) Aneurysm of the internal carotid occurs in almost an equal ratio in the two sexes if all types are included, but the spontaneous variety is much more frequent in the female than in the male.

Bibliography

1. Agnew's Surgery, 1878, i, 591.
2. Bryant's Operative Surgery, 1908, vol. i.
3. American Text-book of Surgery, 2d ed., 1895.
4. Gross's System of Surgery, 6th ed., 1882, i, 749.
5. Johnson's Operative Therapeusis, 1915, vol. i, 387.
6. Cooper (Lectures of), 3d American ed., 1831, ii, 62.
7. Dupuytren: Leçons oral. de clin. chir., 2d ed., 1839, iii, 56.
8. Fenger and Lee: Gaillard Med. Jour., 1882, xxxv, 10.
9. Duke: Dublin Med. Press, 1848, xix, 65.
10. Chassaignac: Bull. de la Soc. de chir. de Paris, 1859, x, 83.
11. Pircher: Wien. med. Wchnschr., 1862, p. 553.

12. Porter: Dublin Hosp. Repts., 1830, v, 208; Dublin Jour. Med. Sci., 1840, xvii, 83.
13. Moser: Inaugural Dissertation, Strasburg, 1911, p. 7.
14. Dubrueil: Gaz. méd. de Paris, 1883, Année 54, 6 s., 373 and 398.
15. Helferich: Deutsch. Ztschr. f. Chir., 1902, lxvii, 592.
16. Fleming: Keen's Surgery, 1911, v, 320.
17. Hebenstreit: Keen's Surgery, 1911, v, 320.
18. Cooper (Lectures of), 3d American ed., 1831, ii, 62.
19. Buck: New York Med. Jour., July, 1857.
20. Briggs: Nashville Jour. Med. and Surg., 1871, n. s., vii, 102.
21. Wyeth: Tr. Am. Med. Assn., 1878, xxix (Appendix, Prize Essay), p. 136.
22. Halsted: Keen's Surgery, 1911, v, 321.
23. Matas: Keen's Surgery, 1911, v, 321.
24. Wagner: Keppler's Inaugural Dissertation, Univ. of Leipzig, 1910, p. 14.
25. Vander Veer: Tr. Am. Surg. Assn., 1886, iv, 252.
26. McMullen and Stanton: Ann. Surg., 1910, li, 76.
27. LeFort: Bull. de l'Acad. de méd. de Paris, 1917, lxxviii, 3 s., 108.
28. Bruns (in Blauel): Beitr. z. klin. Chir., 1903, xxxix, 620.
29. Perthes: Keppler's Inaugural Dissertation, Univ. of Leipzig, 1910.
30. Morestin: Bull. et mém. Soc. de clin. de Paris, 1915, n. s., xli, 2443.
31. Moser: Inaugural Dissertation, Strasburg, 1911, p. 7.
32. Agnew: Tr. Am. Surg. Assn., 1886, iv, 252.

TABLE I.

No.	Surgeon.	Reference.	Sex.	Age.	Side.	Duration	Vessel ligated.	Date.	Rec.	Died.	Cause of death.
1	Cooper	Lect. of, 3d Am. ed., 1831, ii, 62	M.	50	L.	6 mos.	C. C. A.	6–22–1808	Yes	....	.....
2	Dupuytren	Leçons oral. de clin. chir., 1839, 2d edit., iii, 56	F.	56	L.	8 yrs.	C. C. A.	1–19–1818	...	Yes	Cerebral complications, 8 days
3	Porter	Dubl. Hosp. Repts., 1830, v, 208; Dubl. Jour. of Med. Sc., 1840, xvii, 83	F.	40	R.	15 yrs.	C. C. A.	8–21–1829	Yes	....	.....
4	Porter	Dubl. Jour. of Med. Sc., 1840, xvii, 86	M.	38	L.	5 wks.	C. C. A.	9–22–1838	...	Yes	Hem., 50th day
5	Syme	Lond. and Edinb. Month. Jour. Med. Sc., 1842, ii, 961	F.	60	....	5 mos.	C. C. A.	April, 1842	...	Yes	No assignable cause 30 hours
6	Perier	Receuil de mém., de méd. et de chir. et de phar. Militaires, 1854, 2 s., xiv, 311	M.	19	L.	14 days	.....	....	...	Yes	Hem. soon
7	Duke	Dubl. Med. Press, 1848, xix, 65	M.	32	R.	1 yr.	C. C. A.	6–10–1847	...	Yes	Hem., 5 weeks
8	Chassaignac	Bull. de la Soc. de chir. de Par., 1859, x, 83	M.	26	L.	Short time	C. C. A.	August, 1859	Yes	....	.....
9	Pircher	Wien. med. Wochft., 1862, p. 553	F.	8	L.	1 mo.	.....	....	...	Yes	Hem., 1 month
10	Godfray	Med. Times and Gaz., 1882, ii, 409	M.	28	R.	5 mos.	C. C. A.	7–30–1876	Yes	....	.....
11	Vander Veer	Trans. Am. Surg. Assn., 1886, iv, 253	M.	40	L.	2 mos.	.....	....	...	Yes	Apparently of cerebral embolus in about 3 months
12	Agnew	Trans. Am. Surg. Assn., 1886, iv, 252	F.	..	....	8 mos.	C. C. A. S. T. A. and L. A. C.C.A. (opp.)	1883 1883	...	Yes	Sepsis, in about 3 weeks
13	Dubrueil	Gaz. méd. de Par., 1883, Année 54, 6 s., 373 and 398	F.	38	L.	6 mos.	C. C. A. Same day later C. C. A. (same) E. C. A. I. C. A. S. T. A.	5–29–1883	...	Yes	Hemiplegia, 14 days
14	Wyeth	New York Med. Jour., 1883, xxxviii, 428	F.	60	L.	10 yrs.	C. C. A. E. C. A. S. T. A.	1883	Yes	....	.....
15	Creus	El Genio Medico-Quirurgico, 1884, xxx, 191	F.	63	R.	2 yrs.	C. C. A.	3–13–1884	Yes	....	.....
16	Coomes	The Med. Herald, 1885, vii, 503	F.	..	L.	10 days	.....	....	...	Yes	Hem., exhaustion 10 days after observation.
17	Hulbert	St. Louis Cour. Med., 1886, xvi, 265	F.	19	R.	....	C. C. A.	....	...	Yes	On operating table from rupt. of sac while attempt. to lig. I. C. A. asphyxia.
18	Clementi	La Riforma Medica, 1890, vi, part 1, 478	F.	24	L.	1 yr.	C. C. A.	8–3–1889	Yes	....	.....
19	Richardson	Jour. Am. Med. Assn., 1890, xv, 180	F.	35	R.	Short time	.....	....	Unimproved	....	.....

NOTE—C. C. A.—Common carotid artery. E. C. A.—External carotid artery. I. C. A.—Internal carotid artery.

Cause.	Remarks.
None	Externally at angle of jaw a swelling, pain in head, sac emptied by compression, to regain original size with one contract. of heart. Art. divided and lig., but pulse did not entirely cease. Headache relieved immediately. Pat. had scarcely an unpleasant symp. Tum. gradually diminished, obscure pulse present until Sept., 1808, when it could be felt no longer.
Probably syphilis	Entered the hosp. Jan. 14, 1818, for a lump behind the angle of the jaw, lately increasing rapidly. Evident both at the back of the mouth and by a slight puffiness externally. Soft and elastic in consist. Puls. apparent, expansile, by compres. arrest. and tum. dimin. in size, dysphagia, some fixation of jaws. No beats after op. Pat. did tolerably well until Jan. 22, now pulse small, ideation incoherent, wound foul, by the 27th breathing dyspnoeic, cough, neck stiff, unconsciousness, death. At autop. an aneur. of the I. C. A. found and the arterial walls studded with lime salts.
None	Admitted Aug. 19, 1829 for a tumor in the neck, visible exter. and pulsated violently, rt. hemicrania, nothing seen in mouth. Aft. op. no puls., but giddiness and numbness in the rt. arm, later return of puls. in mass, 4 mo after op., a suppurating sac burst, eventually complete recovery and return to her occupation of servant. The woman attributed the trouble to a relic of a suppurating tooth. She died on September 7, 1836. Autopsy revealed the remnant of an aneurismal sac of the internal carotid artery.
None	Admitted Sept. 19, 1838, mass present. both within the mouth and externally. Puls. could be seen, uncomfortable, pulsated, hoarseness. Puls. ceased after lig., pain disappeared. Had the appearance of progressing favorably, but on October 22, a change for the worse occurred and by the 27th a fluctuating mass at the operative site, dyspnea and dysphagia. Incision of the mass gave exit to much pus tinged with blood. October 30, second. hem. from wound, controlled by packing, repeated at intervals to November 12, when pat. died. Aut. could not be obtained.
None	Tumor for 5 mos. in the throat in the usual situation of abscess. When viewed through the mouth it pulsated vigorously. Ligation did not entirely arrest the throbbing. Syme saw the pat. in consultation. The diag. was between abscess and aneurism, Syme leaning to the latter. The woman was autopsied but no cause could be adduced for death.
None	Young man was thrown from a horse 2 mos. previously, but incurred no injury except a sprained wrist. Dec. 4, 1843, he complained of slight pain in the neck and rumbling in the lt. ear. December 7, a slight puffiness was noticed behind the jaw and the mouth was quite fixed. There was a mass at the back of the mouth. The patient could swallow beverages only. According to the writer the tumor had neither the characteristics of an abscess nor of an aneurism. December 9, man had hem. from the nose and mouth, repeated on the 12, 15, 17. Though the symp. were obscure, P. now concluded he had to deal with an aneur. and requested a consultation. On December 18, while M. Récamier was introducing a finger, the sac ruptured, and patient soon expired. An aneurism of the internal carotid artery which had burst into the mouth was found at necropsy.
None	Duke was about to puncture a pharyngeal swelling when he fortunately introduced a finger and detected puls. He changed his diagnosis from abscess to aneurism. A consultant did not consider the condition so serious and lanced the swelling, necessitating ligation of the common carotid. The operation was followed by slight paralysis.
None	Hem. after puncture of a supposed pharyngeal abscess, calling for ligation of the common carotid artery, post-operative aphonia, headache for 24 hours, after one year complete recovery.
None	This case was diagnosed as abscess. The patient could not open the mouth, swelling presented externally, made an incision but did not reach the abscess cavity. He therefore called in consultants who were agreed with him that the lesion was abscess and advocated the insertion of a trocar, again with no result. The child died suddenly February, 7, 1862, of hem. into mouth. At autopsy there was a large aneur. of the internal carotid artery.
Syphilis	First noticed a lump February, 1876, gradual increase in size, pulsated, bruit, dysphagia, syphilitic taint. After op. sec. infect. with collection of pus. September 5 sac burst into the pharynx and a quantity of blood and mucus spat up, followed by great relief. Patient discharged September 11, 1876, cured. September, 1882, the patient was alive and enjoying good health.
None	This man was not operated upon but treated on two separate occasions by digital compression apparently with benefit. Suddenly he experienced a terrible pain in the head and toppled over dead. Aut. could determine no definite cause for the episode.
None	Admitted to the Univ. Hosp., Phila., about 1883, for a tumor beneath the angle of the jaw and another projecting into the pharynx. Pressure on the primitive carotid caused the tumor to materially diminish in size. Pulsated throughout, distinct bruit. After the 1st op. the woman did well for 2 weeks, then puls. returned in the tumor. By making compression on the opposite carotid all motion in the growth ceased. He therefore placed a thread around this vessel, now no commotion nor motion could be detected. Soon afterward sac ulcerated into mouth permitting the escape of a large amount of blood. The bleeding was eventually arrested by packing but the patient died about a week after the last ligation and three weeks after the 1st of sepsis.
None	Tum. of the lt. soft palate, disturbance of speech and deglutition, hard, no fluct. or puls., diagnosed adenoma or sarcoma. Attempted extirpation, rupture of sac, free hem, C. C. A. ligated; an hour and a half later repetition of bleeding, same C. C. A. tied at a higher level, and other vessels already enumerated. After 1st lig. aphonia and disturbed respiration June 10, hemiplegia same side as lig. June 11, coma 12th, death. Autopsy revealed an aneurism of the left internal carotid in its cervical course. The vagus nerve was caught up in the first ligation. There was also a focal hemorrhage at the base of the brain right side.
None	Woman, single, no children, seamstress, no evidence of lues, tumor behind the angle of the lt. jaw, ringing in the ear, hemicrania, no pain, no apparent cause. He proposed to tie the internal carotid but found it impossible so ligated the vessels indicated. The patient recovered, the aneurism decreased in size almost to the vanishing point, the hemicrania was relieved and the patient felt perfectly well.
None	Interference with swallowing of both liq. and solids, dyspnea, lump in throat extending inward and beating in unison with the pulse, smooth, ovoidal, expansile, throbbing arrested by pressure to carotid, bruit, no cause could be assigned for the lesion. There was no evidence of syphilis. After operation the tumor decreased in size, swallowing was facilitated, breathing improved and pulsation arrested. She was discharged April 3, 1884, cured.
None	First saw December 14, 1885, for uncontrollable bleeding from the mouth and nose for which he could find no assignable cause. Later discovered pulsation both internally and externally, besides a lump both on the inside and outside of the oral cavity. Bleeding recurred at intervals until December 23, when the patient expired. Diagnosis of aneurism of I. C. A., made prior to death and confirmed at autopsy. No operation was done.
None	At first diagnosed abscess, punct. with diagnostic needle and pure blood withdrawn, diag. changed to aneur. While Dr. Mudd was attempt. to tie I. C. A., the sac burst into the mouth, controlled by knotting a temp. ligature which had been placed around the common carotid artery for an emergency. This maneuver controlled the further escape of blood from the sac but the patient died on the table of asphyxia from blood aspirated into the bronchi notwithstanding a prompt tracheotomy.
None	Tumor below and in front of lt. ear, increasing, pulsating, internally a bulging, puls. and push. tonsil to rt., compres. pract. 26 days without benefit, discont. because of pain and fever. After 4 months complete cure, the pulsations internally and externally had disappeared, and the volume of the growth had notably decreased. She was discharged September 1, 1889.
None	Patient presented a bulging pulsating mass in the rt. lat. pharyngeal wall. Pressure on C. C. A. dimin. vol. of tum., and puls. ceased, bruit heard. Left Dr. R. in a huff, because he desired to exhibit her before the District of Columbia Medical Society for consultative purposes. While under Richardson's care she received no treatment.

S. T. A.—Superior thyroid artery. L. A.—Lingual artery. I. J. V.—Internal jugular vein.

TABLE I.—(*Continued.*)

No.	Surgeon.	Reference.	Sex.	Age.	Side.	Duration	Vessel ligated.	Date.	Rec.	Died.	Cause of death.
20	Edmunds	Trans. Path. Soc., Lond., 1891, xliii, 42	M.	36	R.	1 mo.	.....	....	...	Yes	Coma, 12 days
21	Polak	Weekblad. Nedrl. Tijdshft., 1900, xxxvi, part 1, 1213; and Weekblad. Nedrl. Tijdshft., 1895, xxxi, part 2, 992	F.	65	L.	....	C. C. A. C. C. A. and division	9–27–1894 4–24–1895	Yes	....	.....
22	Narath	Nedrl. Tijdshft. v. Geneesk., Amst., 1903, 2 R., xxxix, 1174	M.	28	R.	4 yrs.	C. C. A. E. C. A. I. C. A.	2–1–1897	Yes	....	.....
23	Mayo, C. H.	St. Paul Med. Jour. 1899, 1, 751	F.	23	R.	6 yrs.	C. C. A.	8–2–1889	Yes	....	.....
24	Minich	Pest. med. chir., 1901, xxxvii, 765	F.	30	....	....	.....	....	...	Yes	Hem., 3 days
25	Helferich	Deutsch. Zeitshft. f. Chir., 1902, lxvii, 592	F.	58	R.	8 mos.	C. C. A. I. C. A.	5–3–1902	Yes	....	.....
26	van Campen	Nedrl. Tijdshft. v. Geneesk., Amst., 1903, xxxix, 1172	F.	58	R.	....	C. C. A.	1902	Yes	....	.....
27	Texier	Bull. méd. Par., 1907, xxi, 593	F.	74	L.	1 yr.	.....	....	...	Yes	Cerebral symptoms 7 days
28	Texier	Bull. méd. Par., 1907, xxi, 593	F.	47	L.	Short time	.....	....	Unimproved	....	.....
29	McMullen and Stanton	Annals of Surg., 1910, li, 76	F.	60	R.	1 yr.	Endoaneurismorrhaphy	12–29–1908	...	Yes	Hem. secondary 20 days
30	Texier and Levesque	Gaz. méd. de Nantes, 1910, xxviii, 466	F.	42	L.	....	.....	....	Unimproved	....	.....
31	Perthes	In Keppler, Inaugural Dissertation, University of Leipzig, 1910	F.	44	L.	3 mos.	C. C. A. E. C. A. I. C. A. (above sac) Extirpation of sac	7–19–1909	...	Yes	Hemiplegia, July 26, 1909
32	Moser	Inaugural Dissertation, Kaiser Wilhelms Univ., Strasburg, 1911, page 7	F.	60	R.	6 days	C. C. A. I. C. A. Above and below Extirpation of sac	7–7–1910	Yes	....	.....
33	Wagner	Keppler, Inaugural Dissertation, Univ. of Leipzig, 1910, page 14	..	Child	....	....	.....	....	...	Yes	Hem. quickly spontaneous rupture
34	Liébault and Daudin-Clavaud	Arch. gén. de chir. de Par., 1912, Année vi, 1436	F.	75	R.	18 mos.	.....	....	Unimproved	....	.....
35	Shipley and Lynn	Jour. Am. Med. Assn., 1916, lxvi, 1602	F.	41	L.	2 yrs.	C. C. A. E. C. A.	1–31–1915	Yes	....	.....
36	Winslow, Nathan	.....	F.	48	R.	9 mos.	C. C. A. E. C. A.	2–1–1921	Yes	....	.....

Cause.	Remarks.
Syphilitic	This man presented a bulging tumor in the rt. side of neck, rapidly increasing in size, no pain or discomfort, pulsated forcibly, lues 12 years previously. Ex. caused attacks of giddiness, fainting, so did not op. Autopsy detected an aneurism of the internal carotid artery close by its origin.
None	Exhibited in lt. side of neck a potato size tum. that was growing, dizziness, pulsation to sight and touch. Compression caused a partial collapse. On the rt. side of neck in course of external carotid a smaller puls. growth. After ligaturing of lt. com. car. made an uneventful recovery and discharg. some weeks later At that time mass in rt. side had about disappear. from self-applied compres. 5 months later woman again sought treat. for a return of sympt. in the lt. side of the neck. Lt. C. C. A. again exposed and it was at that time that an aneurism was discovered arising from the internal carotid. C. C. A. again tied and divided. Some weeks later weak pulsation could be felt in a small hard tumor. March 22, 1900, she again sought Polak for disconcerting symptoms in the aneur. of the rt. side for which ligation of the rt. com. car. was done. The patient now 71 years of age recovered without bad symptoms and left the hosp. in 10 days.
None	Seen January 21, 1897, for lump in rt. side of neck of 4 months' duration. Tum. was growing and causing trouble in swallowing and rt. hemicrania. He had never had lues. No evidence of arteriosclerosis. Tum. pulsated and expanded throughout. After oper. puls. ceased. The patient was discharged February 26, 1897. The tumor was smaller, did not pulsate or cause pain. The man was living and well 5 years after the operation.
None	Admitted July 31, 1899, for a lump which crowded the rt. pharyngeal wall to the midline. Externally the lesion presented beneath the ear, pressure caused the tumor to nearly disappear. The mass pulsated, Bruit was heard. The rt. half of the tongue was atrophied. The trouble was of 6 years' duration.
None	The patient applied to a Dr. with the complaint of an intrabuccal swelling of 3 weeks' duration and dyspnea. Mistaking it for abscess, he lanced it with a gush of blood, arrested with difficulty. Two days later fatal hemorrhage. Aneur. exhibited neither puls. nor fluct. The postmortem yielded a sacciform aneur. of the inter. car. at the base of the skull and project. into the pharynx. No mention of by whom, when or where observed. In the discussion Ludvig Ihrig cites quite a similar case observed in 1894 in the 2d surg. clinic.
None	Rt. pharyngeal tumor, no pulsat. or fluct., explorat. punct. dry,diag. lymphosarcoma and buccal extirpat. attempted with tearing of sac, hem., oral tamping, tracheotomy, resection of mandible and lig. mentioned, with exploration of the aneurism which was as large as a walnut. The intervention followed by paralysis of the hypoglossal and some interference with deglutition. The patient was discharged June 20, 1902.
None	Unmarried woman had never had any illness bearing on the trouble. She appeared in June, 1902, with a strange feeling in the throat, change in voice and buzzing in head, indefinite swelling in rt. side of neck, and in the rear of the mouth a tumor springing from the rt. pharyngeal wall which made one think of abscess. This supposition was rendered untenable by the pulsation imparted to the palpating finger, difficulty in swallowing. He tied lig. as lightly as possible for fear of cutting through atheromatous vessel. Aft. op. mass decreased in size, puls. stop., swallow. regained.
None	Sought advice November 22, 1906, for tumor in the throat, occupying the entire lt. half of the pharynx and push. the tonsil and uvula to the rt. Extern. no suggest. of swelling. Lump in mouth did not pulsate. It was taken for abscess and stuck with an aspirator. Upon withdrawing blood he thought of aneur., also injury to a vessel. Patient died November 29, 1906 and at autopsy an aneur. of the int. car. the size of a hen's egg was found. He could adduce no cause for the malady and explained the coma by cerebral edema.
None	Consulted March 6, 1907, for a swelling in the throat with no uncomfortable sympt. save an occasional sensation of an obstacle in the throat, and interference with breathing at night. Had never been sick. No buzzing in the lt. ear. Swelling in the left rear of the mouth pushing pharyngeal wall toward the midline, no pulsation except at lower end of tumor, soft bruit both internally and externally. Advised iodide of potassium and to return in some months, until then reserving the possibility of ligation.
None	Painless, pulsating steadily developing mass in the rt. side of the neck, no nerve involvement, no cerebral symptoms, no specific history, tumor in the throat. Under ether aneur. exposed, vessel clamped above and below sac, sac opened, clots removed and walls sutured, clamps removed, blood turned into artery, but slight seepage through stitch holes, controlled by pressure, vessel pulsated normally, 15 days aft. op. discharged well, 3 days later returned, hematoma under scar, opened, free hem., attempts to clamp ves. fail., so packed sac but patient died in a few hours.
None	Patient perceived a swelling in the lt. wall of the pharynx, pulsations corresponding to the beats of the pulse in the diseased neck, tumor occupying entire lt. half of the buccal cavity, size of a pigeon's egg and pushed in front of it the ton. and pharyngeal wall. Externally no appreciable swelling. Bimanual palpation could not detect puls. nor fluct. Ligation of the com. car. was withheld because the patient was the mother of 4 small children and she was placed on anti luetic treat. to return in several months for further observation.
None	Widow, 2 children, no miscarriages with fulness in the neck for 3 months, no annoyance of any kind save the sensation of a clod stuck in the neck, consulted Dr. Lohse for dyspnea and a tumor in the left side of the tonsillar region. He wavered between aneur. and abscess. Although the tum. pulsated a trocar was inserted and pure blood aspirated, with withdrawal of needle but slight leakage from the wound which soon ceased. Bruit heard behind the angle of the jaw, growth projected inward toward the midline. On exposure of ext. car. compression did not control pulsation, but comp. of the com. car. did. Aft. lig. the pulse forthwith disappeared, but the sac if squeezed empty, refilled tolerably quickly. To expose sac doubly lig. ext. car. and divided, soft parts retracted and the entering and emerging segment of int. car. demonstrated. Four hours aft. op. suddenly lost power to speak and developed paralysis of face and rt. arm, convul. in upper and low. rt. limbs, no imp., died July 26, autop. aneur. walls smooth.
None	Woman had had 2 preg. 6 days before admission had lifted a bundle to the head, noticed no inconvenience at the time, next day roaring in rt. ear, following day a mass in the rt. side of the neck, no pain, buzzing worse and headache. Entered hosp. July 5, 1910 with tumor size of hen's egg in neck, which pulsated synchronously with the heart, and bruit, upon compression tumor was emptied and puls. ceased, both to return when pressure was released. Nothing abnormal within the throat. At op. aneur. found to spring from the I. C. A., sac isolated and extirpated. Postop. headache, some impediment to speech, slight paralysis of the rt. arm and leg, later dysphagia, by July 10 the motor disturbances had about disappeared and the patient was discharged July 31, 1910, in good condition. No evidence of arteriosclerosis in the extirpated sac.
None	Related by Lohse, cited by Keppler and told by Wagner. Late one evening he had been called to open a tonsillar abscess. Much to his embarrassment he had forgotten his scalpel. When he returned the next morning he learned the child had died suddenly during the night from the bursting of an aneurism.
None	Tumor in mouth, difficulty in swallowing, impairment in speech, no pain, otherwise well, denied luetic infection, buccal tumor almost obliter. oro-pharynx, to finger expansile puls., which pressure on car. arrested, no bruit, nothing externally in evidence., Prof. Moure proposed operation but the woman refused. She was seen again later, the tumor had increased in size leaving only a narrow slit for the passage of food. Despite this she refused to listen to operation.
None	This is the first case to have entered University Hosp., Balto.; she was admitted January 11, 1915, for a bulging in the lt. side of her throat with increasing dyspnea and difficult deglutition, but slight external evidence of the mass, inner surface smooth, elastic to touch, pulsating throughout, bruit heard behind the angle of the jaw. Post-operative course smooth, never any evidence of intracranial damage, puls. and bruit ceased with applicat. of lig. to return in weaker form 6 months later. Denied lues, appar. confirm. by neg. Wasser. January, 1921, bulg. in mouth and puls. still persist.
None	This is the 2d case to be seen in the Univ. Hosp., Balto. Admitted January 24, 1921, for a bulg. in the rt. side of her throat with increasing dyspnea, difficult deglutition, but slight external evidence of the mass, pharyngeal growth pulsating to both sight and touch, expansile, almost obliterated the pharynx. With tying of the vessels cessation of puls. and bruit, never to return, few days slight headache, no disagreeable brain symptoms. September 30, 1921, lump gone, no puls. or bruit, no jarring of the head, can swallow solids and liquids, feels perfectly well and again employ. as cook. June 20, 1922, perfectly well.

TABLE II.

No.	Surgeon.	Reference.	Sex.	Age.	Side.	Duration	Vessel ligated.	Date.	Rec.	Died.	Cause of death.
1	Liston	Lancet, London, 1842, i, 864	M.	9	R.	2 mos.	C. C. A.	About 10–21–1841	...	Yes	Sec. hem. in neck 13 days after op. repeated 6 times. Died November 5, 1841
2	Neuffer	Ztschft. f. Wund-ärtzeu. Geburtsh., 1852, iv, 206	M.	13	L.	....	.....	....	...	Yes	Spont. hem. from mouth, 13th day after beginning of disease
3	Heaton	Birmingham Med. Rev., 1891, xxx, 304	M.	20	L.	10 days	C. C. A.	7–3–1890	...	Yes	Hem. into mouth 3 days after op.
4	Lyot et Petit	Gaz. méd. de Par., 1897, 10 s., i, 159	F.	19	L.	1½ mos.	.....	....	Spon cure Yes	.....	.....
5	Wulff	Münch. med. Wochshft., 1900, p. 687	F.	8	L.	2 mos.	C. C. A.	2–4–1900	Yes	....	.....
6	Johnson	Trans. Am. Laryng., Rhinol. and Otol. Soc., 1901, vii, 226	M.	4	L.	10 days	.....	....	...	Yes	Repeated hem September 11, 1900
7	Zamboni	In del Fabro 13 Cong. intern. de méd., Par., 1900, x, 516, sec. de chir. gén.	M.	60	R.	3 yrs.	I. C. A.	1900	Yes	....	.....
8	Bruns	In Blauel, Beit. z. klin. Chir., 1903, xxxix, 620	F.	58	L.	10 yrs.	C. C. A. I. C. A. E. C. A. Extirp. of sac	12–16–1902 1–14–1903	Yes	....	.....
9	Hirsch	Monatshft. f. Ohrenhlkh., Berl. u. Wien, 1914, xlviii, 780	M.	6	L.	3 yrs.	.....	....	...	Yes	Chloroform, while going under anesthetic.
10	Klarfeld	Wien. klin. Wochsft. 1915, xxviii, 1361	M.	18	L.	7 days	C. C. A. I. J. V.	....	...	Yes	Twelve hours after op., sepsis exhaustion, hemorrhage

EROSIVE INTERNAL CAROTID ANEURYSMS

Cause.	Remarks.
Scarlatina	Six years previously scarlet fever. Two months ago tumor beneath rt. ear. and between arches of the palate impeded both deglut. and resp. Punct. for abscess, gush of blood, controlled by harelip pins and twisted silk. Next day, ligaturing of the C. C. A. was done. Things went on prosperously after the op. until the 13th day when there was a gush of arterial blood from the wound in the neck, repeated 6 times thereafter, causing death in collapse, November 5, 1841. Autopsy showed the trouble to be an aneurism of the int. car. in its extracranial course.
Angina tonsillaris	Began in Fall of 1851 with enlargement of tonsils, especially the left. Food passage narrowed, difficult deglutition. Fixed jaws rendered ex. of the throat difficult. Autopsy revealed aneur. of int. carotid. No operation.
Quinsy	Trouble began June 23, 1890, 3 days before admis. had a profuse hem. from mouth and nose, repeated on second and third of July calling for op. Some swelling in lt. parotid region. Mouth only opened with difficulty showed the lt. tonsil pushed across the midline. Swelling was soft and fluct. and puls. in time with lump on outside. No bruit or thrill. Puls. arrested by pressure on C. C. A. Lig. done by Mr. Bartlett. During the induction of anesthesia breathing ceased for which Mr. Haslam did tracheotomy. Puls. ceased after lig. At autopsy aneur. of I. C. A. found.
Scarlatinal anginosa	Lump inside and outside of the mouth, expansile puls., on aspiration, syringeful of blood, reduction in vol. by pres. on C. C. A. Pat. too weak for op. so a waiting policy adopted with cure in 1½ months. This patient was first seen July 27, 1896, in the service of Dr. Le Dentu.
Follicular tonsillitis	Angina apparently followed by recovery. Soon afterward a physician noticed a tonsil. swel. which he lanced, obtaining blood. Mid. of January, 1900, tumor returned, pulsated. W. suspect. aneu. inserted a needle and withdrew pure blood. He tried compression but the child proving too obstreperous lig. of the main carotid was resorted to. Puls. in the sac ceased never to return, but the clot in the sac suppurated, necessitating incision and drainage, after which the throat returned to its normal size and complete recovery ensued.
Tonsillitis	First seen March 15, 1900, then sick 10 days, in consultat. with another doctor who thought it an abscess. Punct. had been attempted but desisted in on account of the child's unruliness. Tumor inside and outside, no puls. or bruit. June 11, tracheotomy done for dyspnea and the tonsil removed. From then to September 7, 1900, the patient was in fair condition and apparently improving, but on that date the tumor opened spontaneously into the mouth and continued to ooze blood until September 11, when the child died.
Influenza	Three years ago grippe, month later oppressed breathing, hoarseness, one year ago tumor in throat, dysphagia, physician diagnosed abscess and advised incision, patient refused. Later another phys. inserted a needle and withdrew blood. Pharyngeal tumor pushing uvula to left, beating in unison with the heart. The patient experienced no inconvenience from the ligation and left the hospital in eight days. Examination two months later showed the tumor reduced in volume, the sac firm, the voice clearer and deglutition improved.
.....	The author gave no reason for the formation of the aneurism other than the statement by rupture of a true aneur. the formation of a false. Until 10 years ago she had enjoyed good health, then she noticed a slowly growing tumor in the left side of the neck beneath the angle of the jaw, which 4 weeks prior began to grow rapidly. The mouth could be opened only with difficulty. Dysphagia, dyspnea, pain, and paralysis of the lt. hypoglossal and recurrent laryngeal nerves were present. December 14, 1902, sudden cessation of breathing, resuscitated by a hurried tracheotomy. December 16, 1902, had sufficiently reacted to undergo, under ether, lig. and division of C. C. A., from which was experienced no evil results, no reappear. of pulse, tumor smaller but dysphagia persisted, so January 14, 1903, lig. I. C. A. and E. C. A. and extirpated sac. April 20, 1903 hoarseness unchanged, much imp.
Scarlet fever	Bleeding from the mouth and ear following scarlatina. Below lt. ear firm elastic tumor, internally mass springing from lt. pharyngeal wall and extending to the midline. Trouble attributed to middle ear disease and radical mastoidectomy intended. Laryngotomy and artificial resp. failed to cause response. No Wassermann obtained. Autopsy disclosed an extracranial aneur. of the internal carotid artery.
Tonsillitis	Large mass under the angle of the left jaw, 7th day profuse bleeding from the mouth. Operation done by Dr. Marschik. As the jugular vein was injured during the course of the operation it was also tied. Autopsy revealed an aneurism in the external course of the internal carotid artery.

TABLE III.

No.	Surgeon.	Reference.	Sex.	Age.	Side.	Duration	Vessel ligated.	Date.	Rec.	Died.	Cause of death.
1	Mettauer	Am. Jour. Med. Sc., 1849, n. s., xviii, 351	M.	25	R.	6 wks.	C. C. A.	3–8–1842	...	Yes	Cerebral softening 12 days
2	Fingerhuth	Preussiche Medicinal Zeitung, 1864, vii, 183	M.	37	R.	9 mos.	.....	....	...	Yes	Hem. 6 hours.
3	Briggs	Nashville Jour. Med. and Surg., 1871, n. s., vii, 102	M.	23	L.	6 wks.	C. C. A. and I. C. A. above and below sac	2–23–1871	Yes	....	.....
4	Lee	In Fenger and Lee, Gaillard Med. Jour., 1882, xxxv, 10	M.	28	R.	15 days	.....	....	...	Yes	Hem. from punt. instantly
5	Prewitt	Trans. Am. Surg. Assn., 1886, iv, 233	F.	17	R.	4 mos.	C. C. A.	4–4–1885	...	Yes	Hem. rupt. external wall of sac
6	Duchamp	La Loire méd., 1898, xvii, 113	M.	32	R.	8 days	C. C. A. E. C. A. I. C. A.	8–27–1891 About 9–5–1891	Yes	....	.....
7	Booth	Phila. Med. Jour., 1900, vi, 1002	M.	25	L.	18 days	.....	....	...	Yes	Hem. 10 days
8	Ciechomski	In Lewenstern, Centblt. f. Chir., 1901, p. 1228	M.	29	R.	1 day	C. C. A.	....	Yes	....	.....
9	Bobbio	Il. Policlin., Rome, 1906, xiii, sez. chir., 50	M.	20	L.	24 hrs.	C. C. A.	3–8–1904	Yes	....	.....
10	Morestin	Bull. et mém. Soc. de clin. de Par., 1915, n. s., xli, 2443	M.	35	L.	5 mos.	I. C. A. above and below, extirp. sac	5–9–1915	...	Yes	Hemiplegia from embolus 36 hours
11	Bouchard	Rév. gén. de clin. de théra., Par., 1916, xxx, 104	M.	Man	R.	15 days	C. C. A.	6–6–1915	Yes	....	.....
12	Page	In Makins, The Br. Jour. Surg., 1915–1916, iii, 378 and 404	M.	Man	R.	5 days	C. C. A.	1914 or 1915	Yes	....	.....
13	Gjurgjevitch	In Subbotitch, Deutsch. Zeitshft. f. Chir., 1914, cxxvii, 462	M.	...	....	....	I. C. A.	1912 or 1913	...	Yes	Cerebral softening and pneumonia, 4 days

TRAUMATIC INTERNAL CAROTID ANEURYSMS

Cause.	Remarks.
Puncture	First instance of an American surgeon oper. for this aneur. It is recorded that the patient stood the op. well. Became faint on tying the lig. but reacted quickly. Next day lt. leg and arm paralyzed, headache. Increased in severity until the 12th day when the man died. Autopsied.
Puncture by pipe-stem	While stooping to gather some snow to make a snowball struck the end of his pipe which he was smoking against the ground and broke the stem. This was followed by slight bleeding from the mouth which soon ceased. In the meanwhile the patient had placed the pipe in its container not noticing until the next day that a portion of the stem was missing. A search of the ground failed to locate the missing fragment. Five days after accident went to Dr. for pain and stiffness in rt. side of neck and swollen pharynx. Treated locally, stat. for 8 months, then spont. rupt. Aut. reveal. aneur.
Stab	First seen by Dr. B., February 8, 1871, for an expansile tumor in the left parotid region. Bruit present. Dysphagia. First tried pressure over the tumor unsuccessfully. Bore operation well, manifesting no unpleasant symptoms, cerebral or otherwise. When last seen, 1886, he was entirely well. This is the first recorded instance of a successful operation by an American surgeon for aneurism of the internal carotid artery in its cervical course.
Bullet	Wounded 15 days before, followed by a swelling of the hard and soft palate taken for an abscess and incised. Had also complained of inability to speak or swallow and pain in the right side of the neck. Gave the impression of a man with a severe tonsillitis. Only with much difficulty was the patient's mouth opened sufficiently to permit of limited inspection of the throat. Tonsils and soft palate swollen, on hard palate a hickory-nut sized tumor. Thinking it the ball an explor. incision was made with a lancet with death from hem. Autop. demonstrated an aneur. of the int. car.
Bullet	Increasing pharyngeal tumor, pulsating, expansile, bruit, tumefaction externally, paralysis of the pharyngeal muscles, pain in the neck, headache, roaring in the ear, impaired voice, unable to swallow solids, compression of the carotid controlled pulsation. Eight days after operation bleeding from the external sac wall, after several repetitions wound reopened sac incised and cavity packed, bleeding now ceased but patient ultimately died of sepsis. On 23d day epileptiform convulsions. At autopsy the bullet was found in the sac, also thrombosis of cerebral sinuses.
Bullet	First seen August 20, 1891, for wound in the mouth, at end of 8 days bulging tumor in region of the tonsil with appearance of abscess but expansile pulsation to both sight and touch. Situation dangerous as the man had had several slight hem. from the mouth. After 1st op. puls. in sac arrested to return in 3 days necessitating reoperation. After completing the op. D. opened the man's mouth, being greeted with a spurt of arterial blood from the orifice of entrance of the bullet. He hurriedly inserted a finger into the sac until he could plug it with gauze. There was no further bleeding after the tamping. Cicatrization of the sac was complete in three weeks. There were no cerebral manifestations after either operation. The patient was alive 7 years later.
Injury	Patient seen by a number of physicians most of whom were for peritonsillar abscess. Trouble began January 1, 1900. Seen by B., January 8, 1900, for mass in the throat obstructing the pharynx. B. realized that he was in contact with an unusual condition and on January 20, 1900, made a biopsy. Tissue diagnosed chronic inflam., no malig. No puls. in lesion which was hard, no pain. January 29 profuse hem. fatal in few min. Aut. prov. diag. Injured in bicycle accident 2 years previously.
Stab	Swelling at the angle of the jaw, pulsating tum. in pharynx, dysphagia, pain, paralysis rt. vocal cord, on protrusion tongue deviated to rt. Compres. of C. C. A. arrested puls. After 3 years paralysis disappeared.
Stab	Injured January 18, 1904, aphonia, dyspnea, paralysis lt. vocal cord, paralysis lt. side of tongue, pharyngeal bulging, sense of puls. in submax. region. Bimanual exam. showed a fluct. and compressible tumor. With pressure to the primary carotid pulsation ceased and the volume of the tumor notably diminished. With the lig. the growth stopped puls. Man disch. May 2, 1904, tum. had disappeared, no puls., persistence of nervous phenomena.
Missile	Injury received June 25, 1914, in battle, arrived at hosp. November 20, 1914. In upper part of neck puls. Tumor, expans. reducible on pressure, bruit, paralysis of trapezius, sternomastoid, tongue, vocal cord, fearing rupt. into the pharynx oper. was advised. Epileptiform seizures, hemiplegia rt. side. No autopsy done, death attributed to embolism.
Bullet	Soldier, entered base hosp. May 22, 1915, bullet removed and patient making a smooth rec. when June 6 hemorrhaged from wound, oper. for which cleared up diag. At no time were there any cerebral symptoms. Day after op. man desired to get out of bed.
Missile	No history of primary bleeding, injury received at the front in the World War. The soldier presented a tense swelling of the palatal region and the right side of the pharynx. Disappeared after lig. Rt. side facial weakness.
Missile	Very little data obtained, soldier wounded in the Turko-Bulgaro-Serbian War, 1912–1913. Immediately after the operation unconsciousness, autopsied.

TABLE IV.

No.	Surgeon.	Reference.	Sex.	Age.	Duration	Vessel ligated.	Date.	Rec.	Died.	Side.	Cause of death.
1	Joret	Gaz. Méd. de Par., 1840, 2d s., viii, 457	M.	35	30 mos.	.....	.....	...	Yes	L.	Cerebral softening 30 months.
2	Giraldès	Bull. Soc. de Chir. de Par., 1854, v, 70	M.	..	1 mo.	.....	....	...	Yes	L.	Anthrax, 44 days
3	Keen	Med. and Surg. Reporter, Phila. 1894, lxx, 380	M.	25	3 yrs.	C. C. A. E. C. A. I.J. V.	8–15–1893	Yes	....	L.	.....
4	Janssen	Kiel, 1903, p. 11, Press of Schmidt and Klaunig	M.	21	4 days	C. C. A. E. C. A. S. T. A. I. C. A. distal I. J. V. double	8–22–1902	Yes	....	L.	.....
5	Cushing	In Callander, Johns Hopkins Hosp. Repts., 1921, xix, 301	M.	28	....	I. C. A.	1905	Yes	....	R.	.....
6	Bland Sutton	Br. Jour. Surg., 1915, iii, 490	F.	27	7 wks.	Quadruple	12–5–1914	Yes	....	L.	.....
7	Lannois et Patel	La Caducée, 1915, Année xv, 127	M.	22	8 mos.	C. C. A. I. J. V. Lateral sinus	4–22–1915	Yes	....	R.	.....
8	Dufourmentel	La Presse Méd., Par., 1917, xxv, 50	M.	23	8 mos.	Lat. sin. I. C. A.	10–25–1915 11–10–1915	Yes	....	L.	.....
9	LeFort, R.	Bull. de l'Acad. de méd., Par., 1917, lxxviii, 3 s., 108	M.	..	3 mos.	I. J. V. double, inc. of sac, sut. of art. cap. by wall of vein	7–20–1917	Yes	....	L.	.....
10	Heuer	In Callander, Johns Hopkins Hosp. Rpts., 1921, xix, 302	M.	48	....	Band to I. C. A.	1917	Yes	....	R.	.....

ARTERIOVENOUS ANEURYSMS OF INTERNAL CAROTID ARTERY AND INTERNAL JUGULAR VEIN

Cause.	Remarks.
Bullet	No treatment. Autopsy proved the diagnosis. Ball found encapsulated in the internal jugular vein. Wounded in a duel May 2, 1835, died October 23, 1837. Tumor with thrill and pulsation, asphagia and epileptiform seizures 4 months after injury.
Bullet	Shot June 15, 1854. Tumor in upper part of left side of neck with thrill and murmur. Autopsy demonstrated the condition. Ball in sac connecting artery and vein. No treat.
Bullet	First seen August 9, 1893, had contractures of the right arm, bruit, thrill, left side of neck. Slight external swelling. Sought relief for noise in ear. After op. no mental disturb. slight ptosis, disch. middle of September, practically cured.
Stab	Wounded August 17, 1902, first seen August 21, with a swelling behind the angle of the lt. jaw, elastic, thrill and souffle. No untoward symptoms after lig., save a persistent inequality of the pupils. Discharged September 20, 1902, as cured.
Injury	Entered Johns Hopkins Hosp., May 5, 1905, with roaring and buzzing in rt. ear, bruit, rt. exophthalmos, diplopia, etc., and fract. base of skull. Improved by operation.
Bullet	Swelling, buzzing in lt. ear, thrill, murmur. Oper. followed by paralysis rt. leg, diploplia, optic neuritis, etc. April 15, 1915, sight failing. Symp. believed due to thromb. cav. sin.
Shell	Soldier, wounded August 26, 1914. Auditory disturbances, thrill, bruit, rt. lingual and laryngeal paralysis. Operated. Eventually made a good recovery.
Bullet	Soldier, wounded February 28, 1915. October 5, pulsating tumor discovered in floor of lt. ext. aud. canal. October 25, lat. sin. lig. November 10, int. car. lig. Disch. in February, 1916, ret. to duty in April.
Bullet	Wounded April 17, 1917. Thrill left side of neck, arrested by pressure. Circulation restored through carotid with release of compression, no nervous phenomena. Patient did so well he requested to be discharged the 5th day after op.
Injury	Admitted to Johns Hopkins Hosp., March 9, 1917, for dimness of vision, deafness in rt. ear, rt. exophthalmos, murmur. Lumen of int. car. almost obliterated with aluminum band.

THE STRAIGHT VESSELS OF THE TERMINAL ILEUM

By R. L. Payne, M.D.
Norfolk, Va.

It is my desire to call attention to the straight vessels of the terminal ileum as a hitherto undescribed though definite anatomical feature of this portion of the intestinal tube. Its value lies in the ability of the surgeon to recognize at a glance this particular and important part of the intestinal tube, namely, the last inch and one-half of the terminal ileum, by recognizing the straight vessels, found only at this point in the whole of the intestinal canal as a definite and distinguishing feature.

From the pylorus downward in the small bowel to a point approximately one and one-half inches from the ileocecal valve the visible vessels run at right angles to the long axis of the bowel, passing up from the mesentery on each side of the convex surface to meet over the point opposite the mesentery. In the last inch and one-half of the terminal ileum there are, however, one, two or three small straight vessels which come up from the anastomosis formed by the ileocolic and the right colic arteries, sending these branches upward from the ileocecal valve just under the peritoneum and parallel to the long axis of the bowel for a distance of one-half to one and one-half inches or thereabouts. These straight vessels, as shown in the accompanying illustrations, are definite end arteries and run immediately beneath the peritoneal coat of the bowel, whereas the other blood supply

of the small bowel runs between the mucosa and the submucosa.

With regard to frequency, we have observed these vessels to be present, and definitely indicate to us this particular point of the small bowel, in one thousand successive laparotomies.

While there are many reasons for locating without difficulty the ileocecal valve, the greatest use for this definite anatomical point is probably to be found in locating the appendix, using the last inch and one-half of the terminal ileum as a more definite and more ready guide to the base of the appendix than other methods of location, such as following the longitudinal muscle bands of the large bowel.

OCCLUSIONS OF THE MESENTERIC VESSELS

By J. M. Mason, M.D.
Birmingham, Ala.

This subject has recently received much attention from medical writers and the literature has been gone over so carefully that it would unduly prolong my paper to review it extensively. To touch on the more important facts concerning the etiology, pathology, symptomatology and treatment would best serve our purpose now. For a more exhaustive review I would particularly refer you to the excellent paper of Klein, just published in the October number of *Surgery, Gynecology and Obstetrics.*

Occlusions may be of the arteries or of the veins, and these systems seem to be affected about equally. The occlusion may be caused by embolism or by thrombosis. The development may be sudden and complete or gradual and incomplete.

Arterial Side. Arterial emboli usually come from the heart "either from vegetation on the valves or from thrombi in the auricles."[1] In some cases they come from atheromatous patches in the aorta.

Arterial thrombosis is usually associated with generalized arteriosclerosis, but the condition may be primary in the mesenteric arteries.[1] Pressure on the superior mesenteric artery by an aneurysm or extension of an aneurysmal clot into the mouth of the superior mesenteric artery may be causes.

Venous Side. In venous occlusions practically all are due to thrombosis. Sometimes the cause is unascertainable or may be extremely remote, as in parotitis or cellulitis of the neck. The most frequent cause seems to be extension of inflammation from acute appendicitis or from an acute inflammatory pelvic lesion.

The condition may be brought about by extension of phlebitis from more remote veins or it may result from a host of inflammatory intra-abdominal lesions. Mechanical factors cause a certain group of cases, such as may be seen in volvulus, strangulated hernia and intussusception.

Anatomy. The superior mesenteric artery, a branch of the abdominal aorta, supplies the entire small intestines and the right half of the colon. The left half of the colon and the rectum are supplied by the inferior mesenteric artery, which is also a branch of the abdominal aorta.

The superior mesenteric artery anastomoses with the pancreaticoduodenalis, thereby making a connecting channel with the celiac axis above. Through the colica media there is an anastomosis with the inferior mesenteric artery below. There are also extensive anastomoses between the different loops in the mesenteric fan.

It is abundantly proven, both experimentally and clinically, that the superior mesenteric artery is not a terminal artery in the sense of Cohnheim. Councilman describes the failure of establishment of a collateral circulation to the large area of tissue supplied by the artery and the extreme length of the intestine, both of which are unfavorable for the development of an efficient collateral circulation.[2]

Animal Experimentation. Much animal experimentation has been done and the following is a summary ef the main results:[1]

Ligation of the Superior Mesenteric Artery in the Dog. Following ligation of the superior mesenteric artery there follows: First, violent tetanic contractions of the small intestines. These persist for two or three hours, with

marked anemia of the intestines, and are succeeded by a state of relaxation and marked congestion. Practically all observers from 1875 to 1909 agree that intestinal infarction now follows. There can therefore be no question that this is an almost invariable if not a constant result.[1] However, Beckman, in 1858, working with rabbits, found no infarction six hours after ligation of the vessels. Ravenna[3] states that in a few instances he found ligation of the superior mesenteric artery without effect. So while intestinal infarction almost invariably follows the occlusion of the artery this does not always occur.

Ligation of Branches. If ligation of a branch takes place near the intestinal insertion, *i. e.*, in the straight vessels, collateral circulation is established in the submucosa. If ligation is done in one of the secondary loops the anastomosis of the arches forms an easy readjustment. Ligation of a primary branch is occasionally followed by infarction.[3]

Ligation of the superior mesenteric vein leads constantly to hemorrhagic infarct. No contrary results are recorded.[1] Ligation of a single or even of multiple branches of the vein is without effect.[1]

Neiderstein[4] experimented by severing the mesentery from its intestinal attachment, in dogs, for varying lengths. Separations 3 cm. in length caused superficial necrosis of the mucosa; lengths of 5 cm. caused necrosis of mucosa as well as hemorrhages into the other coats or else a circumscribed ulcer of the mucous membrane. No animal died unless more than 5 cm. were cut away, in which case a hemorrhagic infarct developed and the animal died. A number of animals with non-fatal injuries were killed in twenty-four to forty-eight hours, and they showed necrosis of the mucosa and hemorrhages into the muscularis.

Schloffler emphasizes the importance of these experiments in showing that not all lesions are fatal and that many heal completely.[3]

These experiments also account, clinically, for the presence

of blood in the stools, a symptom which has been given much weight in making preoperative diagnosis. In all instances the mucous coat is the one that suffers first, and when all the coats are involved it usually suffers most. Inasmuch as destruction of the mucosa is usually accompanied by some bleeding, which may become manifest in the stools, it is possible that, even in the less severe injuries in man, blood in the stools may give a clue to the true condition.[1]

Clinical Cases. Observations on man bear out conclusions reached experimentally on dogs. Cases are divided into acute and chronic by Jackson, Porter and Quinby.[5] Klein[1] makes an analysis of reported cases and shows that occlusion may be followed by three possible results:

1. Establishment of a competent collateral circulation, which may persist throughout life or may subsequently break down, due to disease of the heart or bloodvessels.

2. Intestinal obstruction adynamic in character may develop without infarction, owing to a blood supply sufficient for life of the parts but not for function.

3. Intestinal infarction may develop, varying in degree from a slight lesion of the mucosa to pronounced necrosis of the entire intestinal wall.

Symptoms. In the first group—those with the establishment of an efficient collateral circulation—slight symptoms or none whatever may be noted and the condition may only be found at autopsy in patients dying from some other diseases. Schley[6] states that 4 cases were found in 1600 autopsies at Johns Hopkins Hospital in which hemorrhagic infarction of the intestine had occurred without being suspected during life, a collateral circulation having been established.

Ross[7] reports from Deaver's clinic the case of a man who was seized with severe colicky pains in the abdomen with obstipation, fecal vomiting and other signs of severe intra-abdominal disease. At operation, twenty-four hours later, a thrombus was found in a branch of the superior mesenteric

artery. Hemorrhages were present in the mesentery and free blood in small amount was present in the peritoneal cavity. Deaver decided that the collateral circulation was taking care of the affected segment of intestine and that it was in fair condition. He closed the abdomen without interfering with the intestine and the patient recovered. This well illustrates a case of the second group of Klein, namely, with symptoms of obstruction but without infarction of the intestines.

In the third group—with intestinal infarction—the symptoms are those of sudden, severe, overwhelming intra-abdominal disturbance; colic, vomiting, obstipation usually, and collapse.

Of general symptoms of the disease, Reich[8] gives the following analysis:

Occurrence: Between twenty and sixty years of age: men, 64 per cent; women, 36 per cent.

History: Negative, 33⅓ per cent; remainder—valvular heart disease, arteriosclerosis, aneurysm, etc.

Exciting Cause: Operations, coughing, straining at stool, lifting heavy weights, etc.

Individual Symptoms. Pain: Very severe, colicky in character, present in 85 per cent; generalized in 50 per cent, localized in 50 per cent.

Obstipation: Nearly always present at some time.

Vomiting: At first reflex; later obstructive; finally fecal; in 16 per cent bloody; and it is then specially significant.

Stools: Bloody in 30 to 41 per cent. This is almost pathognomonic when associated with other symptoms. Diarrhea is not uncommon and often precedes the obstipation or may interrupt an attack of obstipation.

Duration: Of the fatal cases, 60 per cent die within the first week, many in the early days of the week. The remaining 40 per cent linger two or three weeks or perhaps longer. These constitute the chronic cases of Jackson, Quinby and Porter.

Reich further divides the cases into: (*a*) Diarrheal group, 15 per cent; (*b*) obstructive group, 35 per cent; (*c*) mixed group, 34 per cent; (*d*) group with meagre symptoms, 16 per cent.

Diagnosis. In cases presenting symptoms such as one would get in the diarrheal and mixed groups the diagnosis will certainly tax the most skilful, and the best that one may be expected to accomplish, perhaps, is the early recognition of a serious intra-abdominal disturbance which demands operation.

In the group with meagre symptoms, Reich states, I think correctly, that diagnosis is practically impossible. Such cases usually occur with coma, uremia, apoplexy and senile dementia. They may show rapid collapse with abdominal distention and indefinite abdominal pains. Apparently such a condition is terminal and is not of surgical interest. In the obstructive group the clearest indications for explanation exist, though a differential diagnosis may be impossible before operation.

Treatment. In cases with meagre symptoms, as above described, no diagnosis will usually be made and no treatment directed toward the intestinal condition will therefore be undertaken.

In the diarrheal and mixed groups, exploration should certainly be undertaken if a faint suspicion of thrombosis or embolism is aroused.

In the obstructive group the most urgent indications for operation exist and this should be carried out with the least possible delay.

All agree that the only treatment of intestinal infarction is excision of the affected portion of intestine and the restoration of its continuity.

It is interesting to know that surgery has brought this usually fatal ailment at least within the realm of possibly curable diseases. Councilman, of Boston,[2] in a paper

entitled, "Three Cases of Occlusion of the Superior Mesenteric Artery," states: "It is important to know that obstruction of the superior mesenteric artery may give rise to paralysis of the intestine, to obstruction, and to peritonitis, and it is a condition which is beyond surgical interference."

Less than three months after the publication of Councilman's statement, J. W. Elliott[9], also of Boston, proved that the condition was not beyond the relief of surgery by successfully resecting a segment of gangrenous gut forty-eight inches long. This operation was performed at the Massachusetts General Hospital on July 10, 1894.[9]

Klein states that since Elliott first performed this operation, about 24 successful resections have been reported.

To this group I desire to add a case of my own in which sixty-five inches of infarcted intestine were successfully resected, and to report another case which ended fatally. The latter will be reported first.

Case I.—In August, 1914, I was called in consultation to see a man, aged thirty-five years, who had submitted to an "interval" operation for appendicitis thirty hours before. Symptoms of obstruction were developing and progressed in spite of treatment. Twenty-four hours later the abdomen was opened and we found an infarction of the intestine about four feet in length. The patient's condition was desperate and resection was out of the question. The necrotic coils were isolated by packs and the patient was returned to bed and died within an hour. Partial autopsy showed thrombosis of the mesenteric veins, originating at the site of the appendix stump.

Case II.—Mrs. D., white, aged thirty-five years, was admitted to the Hillman Hospital, May 18, 1921, at 3.30 P.M. A diagnosis of intestinal obstruction had been made by the physician who had seen her before admission

and the diagnosis was concurred in. She gave the following history: On July 31, 1920, she had undergone a pelvic operation, at which time her appendix and right tube and ovary had been removed and the uterus suspended. She had remained in good health except for a sense of fulness in the abdomen after meals. For two weeks past the discomfort had been worse. On the morning of May 17 there was a small bowel movement. All the afternoon she felt very uncomfortable in the abdomen and about 9 P.M. was seized with sudden, severe, abdominal pains. She took purgatives and enemas without result and grew rapidly worse. The next morning a physician was called and she was admitted to the Hillman Hospital at 3.30 P.M., where I saw her at 4.40 P.M. in consultation with Dr. E. P. Hogan, superintendent of the hospital.

Examination. Pulse rapid and weak; heart sounds faint but no valvular lesions detected; lungs clear. Abdomen very much distended, with tenderness over the lower half. Patient was nauseated and complained of severe griping pains. An old laparotomy scar is present in the midline below the umbilicus. Vaginal examination showed relaxation of the perineum, slight laceration of cervix, fundus uteri in anterior position, no adnexal masses. Patient has large varicose veins in the left thigh, extending to the vulva, but phlebitis is not present.

Operation. Operation was undertaken at 5 P.M., one and one half hours after admission to hospital, and twenty hours after the onset of the severe pain. Upon opening the abdomen, foul-smelling, bloody fluid escaped and dark-colored intestinal coils were at once encountered. On passing the hand into the pelvis, adhesions were detected, and upon inspection it was found that a band two and one-half inches broad by one inch long extended from the stump of the right broad ligament to the under surface of the mesentery and was attached close up to the intestinal border. The band was divided. The lumen of the in-

testine was not encroached on, and there was no intestinal obstruction in a mechanical sense. The intestine was moderately distended, but no more above the band than below it. At the site of the band and for several inches above and below it the intestine was very dusky in hue with no distinct line of demarcation; higher up it became rapidly darker and entirely necrotic. The gangrenous intestine was traced upward to a clear-cut line of demarcation high up on the ileum. The infarcted coils were brought out of the abdomen and resected, with immediate end-to-end anastomosis. The resected segment measured sixty-five inches.

In the absence of other causes for thrombosis or embolism the influence of the adhesive band must be considered in the production of the hemorrhagic infarct. This could have acted in two ways: (1) By interfering with the blood-supply in the terminal vessels of the ileum, thereby causing a lesion of the mucosa, which was the beginning of a venous thrombosis which spread throughout a large area of the mesenteric veins; (2) by so pulling on the root of the mesentery as to cause obstruction to the vessels, simulating a ligation and bringing about a thrombosis in this manner.

Attention has been called to the fact that in embolism the symptoms appear suddenly, whereas in thrombosis they may be slower up to the time that complete thrombosis occurs, then the sudden severe pain manifests itself. After this period the symptoms are the same whether the arterial or venous system is involved and whether thrombosis or embolism has taken place. My patient's symptoms in the afternoon and evening, previous to 9 P.M., were probably those of developing thrombosis, which became complete when she had the severe pain at 9 o'clock.

She left the hospital June 19, 1921, and has remained well.

References

1. Klein: Surg., Gynec. and Obst., October, 1921, No. 4, vol. xxxiii.
2. Councilman: Boston Med. and Surg. Jour., 1894, cxxx, 410.
3. Ravenna: Riv. Veneta di Sci. Med., 1909, l, 136.
4. Neiderstein: Deutsch. Ztschr. f. Chir., 1906, lxxxv, 710.
5. Jackson, Porter and Quinby: Jour. Am. Med. Assn., 1904, xlii, 1469.
6. Schley: Ann. Surg., 1911, liv, 252.
7. Ross: Ann. Surg., 1920, lxxii, 121.
8. Reich: Ergebn. d. Chir. u. Orthop., Berlin, 1913, vii, 515.
9. Elliott: Ann. Surg., 1895, xxi, No. 9.

REPORT OF ANOTHER CASE OF SEPTIC THROMBOSIS OF THE FEMORAL VEIN

By Dyer Findley Talley, M.D.
Birmingham, Ala.

My first case of septic thrombosis of the femoral vein was reported at the Atlanta meeting of this Association in 1903. It occurred in a young woman who was just recovering from a spell of influenza. The sepsis in this case was very intense. While she was undergoing the operation of having the vein opened her temperature in the flexure of the elbow registered 106° F. Her actual temperature was probably more than 107° F. Within a few hours after the clot was removed from the vein her temperature had dropped to normal. She made a good recovery but lost two small toes from gangrene, which caused her practically no inconvenience in walking.

The second case, which is to be reported today, came to me from another institution, where, more than six weeks previously, she had been operated on for some pelvic trouble. The operating surgeon sent me the following history of her condition at that time:

Mrs. L., white, widow, aged thirty-nine years. Admitted February 4, 1921.

Complaint. Severe pain in lower abdomen, right side; fever and chills for two weeks previous to admission.

Family History. Negative for cancer, tuberculosis and hemophilia.

Past History. Usual childhood diseases; no history of serious illness.

Present Illness. Began two weeks previous to admission, with severe cramps in the right lower quadrant of the abdomen, fever and constipation. This condition grew progressively worse up to the date of her admission, when she had a chill; she also had nausea and vomiting.

Physical Examination. A well-developed and well-nourished middle-aged white woman, severely toxic and in very acute pain. Teeth bad, some pyorrhea; neck negative; no rales nor areas of dulness in the lungs; heart slightly enlarged, no murmurs; abdomen large and thick-walled, with distinct rigidity and tenderness in the right lower quadrant, where a mass can be felt. Vaginal some laceration of perineum, profuse yellowish discharge; cervix enlarged and hard; fundus slightly enlarged and fixed, with an inflammatory mass on the right side. White blood count, 44,000; urine has faint trace of albumin.

Course of Case. Operation, February 5, 1921. Low right rectus incision was made, exposing a large inflammatory mass in the right tuboövarian region with plastic adhesions of the omentum, several loops of the ileum and the appendix. The left tube was inflamed, enlarged and tortuous but not abscessed. The right tuboövarian abscess was enucleated and removed. The appendix and left tube were removed, leaving the uterus and left ovary. Abdomen was closed with one large drainage tube in the pelvis.

Patient had a very stormy recovery; her temperature registered 104° on the fourth day; on the tenth day temperature was normal and remained so for about six days, during which time some secondary sutures were put in the wound under local anesthesia; after this the wound healed with no further trouble.

On February 21, patient had a chill and a temperature of 103°; blood count, 21,600; no malarial plasmodia found.

On February 22, temperature 100°, patient feeling better.

The following day she was normal, but on February 27 she had another chill followed by a temperature of 103.5°. She had a headache, some cough and pain in lower half of right chest. Medical man reports fine rales with dulness over lower lobe of right lung; blood count, 18,000; no malarial plasmodia found. Temperature ranged from 100° to 103° for ten days; respirations, 26 to 30.

On March 8, patient was normal and feeling good. This was followed on March 12 by a chill and a temperature of 103°, when she began to complain of pain in left groin. Inguinal glands were enlarged and tender. Ice cap was applied to this region with some relief. Blood count, 14,000; no malarial plasmodia found. Her temperature gradually declined and on March 17 it was 99°; pulse, 90; respiration, 20.

There was still pain in the left groin, extending down left thigh. Patient had grown tired of the hospital and insisted on going home, so an ambulance was called and she was discharged. While she was on her way home she had a chill and was carried to the home of a relative in one of the suburbs of Birmingham. A physician who was called next morning considered her condition rather serious, so he sent her to the Infirmary.

She was admitted March 18. At that time her temperature was 103° F.; pulse, 130 with little volume; tongue furred and dry; skin muddy in appearance. She complained of pain in her left groin and thigh. A mass could be felt under and below Poupart's ligament over the course of the femoral vein. At this time her blood-count was 20,000; urine scanty with a trace of albumin; appetite poor.

Her condition was so unfavorable for operation that preparatory treatment was instituted. This consisted of a large amount of water by mouth; proctoclysis, with glucosa and soda, to the extent that she was able to retain frequent feedings with raw eggs and milk, in addition to what other nourishment she could be induced to take. In addition to

this her emunctory organs were pushed to the limit in order to eliminate as much poison as possible.

This treatment was kept up for twelve days, during which time her temperature ranged from 100° to 103°; pulse, 120 to 140. She had frequent chills followed by profuse sweats. Finally she had a chill which continued for about eight hours, although morphin and atropin were given and blankets and hot-water bottles were used freely.

It was now evident that an immediate operation offered the only hope of saving her life. She was so weak we could not consider giving her a general anesthetic. After the administration of a liberal hypodermic of morphin and scopolamin the parts were infiltrated with a one-half of one per cent of novocain solution and the vein exposed; the vein was large and noncompressible and when opened was found to be filled with a solid clot. The clot was removed up to near the iliac vein, where a catgut ligature was applied. The vein was opened downward to a point where it dips under the muscle and all the clot removed. Forceps were used to remove the clot about two inches further down the course of the vessel, and as the last piece was removed a small amount of pus welled up from the vein. The wound was left open and lightly packed with gauze wrung from hot salt solution.

Patient suffered no shock from operation; she commenced to improve almost immediately; she had no more chills; her temperature reached normal in three days; the swelling in her foot, which was marked before the operation, disappeared; she had no more pain in her groin and thigh; she regained her appetite and grew stronger rapidly. The wound healed in less than three weeks, when she was discharged. In a recent report from this patient she states that she has had no further trouble and is perfectly well.

I. LIGATION OF THE INTERNAL ILIAC FOR ENORMOUS GLUTEAL ANEURYSM; II. CIRSOID ANEURYSM OF THE SCALP

By William D. Haggard, M.D.
Nashville, Tenn.

Any of the branches of the internal iliac or hypogastric artery may become aneurysmal. They are intra-abdominal or intraperitoneal, except those that occur in the peripheral branches, as the gluteal, sciatic, obturator, pubic, etc. Those of extrapelvic origin often extend into the pelvis, and some of intrapelvic origin may be extrapelvic as well. The sacro-sciatic notch forms the groove between the sacs. They are described as pelvic aneurysms, but are more commonly designated as aneurysms of the buttocks. These dilations or extravasations of the gluteal or sciatic arteries occur more frequently than those of the other branches. Iliac aneurysms appeared 11 times in Crisp's[2] classic group of 551 aneurysms, 5 of these being of the internal iliac, making less than 1 per cent of all aneurysms in his collection. The incidence of gluteal aneurysms is, therefore, a much smaller per cent. Of 21 patients reported by Ott,[12] with aneurysms, exclusive of thoracic aneurysms, operated at the Mayo Clinic between January, 1907, and November, 1918, in only 1 was the internal iliac ligated. Rupp, in 1907, was able to collect 45 cases. From 1916 to date only 5 new cases of gluteal aneurysms have been reported in the available literature.

For the most part gluteal aneurysms are traumatic, from

direct or indirect violence. However, when no history may be obtained of injury, they are described as spontaneous.

Aneurysm of the buttocks is ordinarily of the circumscribed type. Of the 38 cases mentioned by Matas[10] in his very comprehensive article, 12 were due to wounds (stabs) and 12 to ruptures or lacerations caused by fracture of the pelvis or contusion, falls on the seat, etc. Goldammer[6] reports 1 case developing shortly after being beaten with a board. Matas further says: "The gluteal artery is more frequently injured by direct wounds (stab); the sciatic by falls on the ischium or seat, which fractures the pelvis or tears the artery at its exit from the sacrosciatic foramen." In Rupp's[13] collection of 45 gluteal aneurysms, 22 were of traumatic origin and 23 spontaneous; 8 of these 23 were indirectly associated with trauma. Indirect traumatism, including the rupturing effect of sudden violent efforts, as lifting or wrestling, are to be regarded as exciting causes only when pathologic conditions such as atheroma exist as a predisposing condition. The left side is more frequently involved, but they may be bilateral. The vast majority occur in men and are most frequent between the twentieth and fortieth years. The size of the aneurysm may vary from that of a small apple to that of a huge tumor which may fill the larger part of the pelvis, and externally may be an enormous tumor as large as an inverted salad-bowl.

The symptoms vary according to size, origin and proximity to and pressure upon the adjacent structures. An expansile, pulsating tumor appearing after traumatism is suggestive of aneurysm. A thrill may be felt or on auscultation a bruit may be elicited. The spontaneous tumors are slow in developing, but the traumatic are usually rapid in development and are large and diffuse. On account of the pressure on the sciatic nerve the early symptoms are considered to be due to sciatica. It is only when a palpable tumor can be made out that the diagnosis can be certain. Aneurysms of the sciatic branch are more movable than the aneurysms of the gluteal

and are in closer proximity to the ischial tuberosity. These aneurysms when they do not pulsate or are filled with hard clots may be mistaken for osteosarcoma or lymphosarcoma, abscess or other tumors. Roentgen ray and exploration with aspirating needle often aid in determining the exact nature of the condition. This together with a careful history, accurate physical findings and necessary laboratory data will usually give the diagnosis.

Matas warns that "these large gluteal aneurysms tend to rupture spontaneously and sometimes choke up the thigh with massive extravasations of blood, causing death from hemorrhage very rapidly."

The prognosis is excellent with modern surgical methods of today. The older methods of treatment have all given way to surgical treatment. Coagulation by the injection of boiling water or chemicals, galvanopuncture, etc., have been discarded in favor of modern surgery.

The first ligation of the internal iliac was done by the extraperitoneal route by Stephens, of Vera Cruz, in 1812. Of 26 ligations of this vessel, on the Hunterian plan, 18 were fatal; but few were done antiseptically and it was a dangerous operation. D'Antona,[3] of Naples, published all the reported cases of ligation of this artery from 1869–1903—in all 25 cases with 15 recoveries. Many of these were in the pre-antiseptic era, which explains in part the 40 per cent mortality. Following this the now-old operation was introduced, a modified Antyllian, as performed by Syme, as the method of "intrasaccular ligature," with a mortality of 16.66 per cent in the 14 cases reported by Delbet.

The ligation of the internal iliac by the intraperitoneal route at the present time is a comparatively simple, benign and satisfactory procedure. This method, unfortunately, will not cure all cases and the results are sometimes uncertain. Gillette[7] reports 1 case with recurrence after seven years, which necessitated reoperation and ligation of the external iliac for a cure. These results can still be further

improved with modern technic, that is, combination of the ligation of the internal iliac, whether permanent or provisional, with free excision of the sac and its obliteration by sutures, as described by Matas—obliterative endo-aneurysmorrhaphy. This technic is well illustrated and described in a case reported by Abbee.[1] This is the method of election in well-developed aneurysms with a definite sac-wall, "provided prophylactic hemostasis can be obtained by preliminary intraperitoneal ligation or temporary compression of the internal iliac." The wisdom of this procedure is illustrated by a case of large traumatic gluteal aneurysm reported by Frost.[5] It was thought that it could be controlled by a buttock incision, but when the fascia was incised "there was a sudden spurt of arterial blood rising upward some four feet." Only the prompt packing of the sac with gauze and immediate ligation of the internal iliac, for which he was prepared, saved the life of this patient and also cured his aneurysm. The same prophylactic hemostatic method should be adopted in the treatment of the acute traumatic aneurysm without definite sac-wall, and the injured artery should be tied or the sac sutured as the case may demand.

The small traumatic aneurysm, or the small pathologic aneurysms which are well-defined outside of the sacrosciatic notch, are best treated by exposing the sac in its entirety and then extirpating it. Such a case of small traumatic aneurysm was successfully operated by Krische under lumbar anesthesia. In gluteal aneurysms which begin in the pelvis the ligation of the internal iliac as near the aneurysm as possible, with continuous external pressure approximating the empty sac-wall until agglutination has taken place, may be sufficient and produce a permanent cure.

The ligation of the internal iliac or its branches does not compromise the nutrition or vitality of the lower extremity. This is due to free anatomosis of its branches and abundant collateral circulation.

"In ligation of the internal iliac, collateral circulation

is carried on by the anastomosis of the uterine and ovarian arteries; of the opposite vesical arteries; of the hemorrhoidal branches of the internal iliac with those from the inferior mesenteric; of the oburator artery, by means of its pubic branch, with the vessel of the opposite side and with the epigastric and internal circumflex; of the circumflex and perforating branches of the profunda femoral with the sciatic; of the gluteal with the posterior branches of the sacral arteries; of the iliolumbar with the last lumbar; of the lateral sacral with the middle sacral; and of the circumflex iliac with the iliolumbar and gluteal." (Prof. Owen.)

There are so few enormous gluteal aneurysms and their successful treatment reported in the literature that the following case is reported, quoting from our records:

File A 12295. Aged sixty-five years, white, female, American, native of Alabama. Complains of intolerable pain in right leg and throbbing tumor of right buttock. She had enjoyed comparatively good health all her life, having no serious illness and no injury. For a number of years she had been having trouble with pains in the calf of her right leg, cramplike, and would have to have it massaged before she could walk. This became gradually worse. During the six weeks prior to her entrance into the hospital she had three or four spells of excruciating pain in the calf of her right leg, referred up her posterior thigh to her right hip, and had to have morphin for the relief of the pain during each of these spells. For the past two days had to have morphin every three or four hours and the pain is only partially relieved. Pain is paroxysmal in character and comes on in spells; unable to move her right leg when in pain and she is never entirely easy.

For the past three years has noticed a swelling and throbbing in the right buttock, like a "heart-beat." This seemed to gradually increase in size but never gave much trouble.

During the past two weeks it has rapidly increased in size until it is as large as an inverted salad-bowl. Pain in this swelling and leg has been so severe during the past two days that has had to be in bed and has been unable to move her right leg. Prior to that time was up and about, walking with a slight limp. Has never had any swelling or discoloration of limbs.

Passed menopause twenty years ago; mother of two children, both living and well; no miscarriages. Family history is negative, except that one brother died of tuberculosis.

Physical Examination. Patient is a rather poorly nourished white female about sixty-five years of age and weighing about 106 pounds. General physical examination was negative except for the condition of her heart and right buttock. There is a soft, blowing, systolic murmur, heard better at the apex and transmitted to the right axilla. Pulmonic second sound was accentuated, but no enlargement of the heart made out. Rate, 115; temperature, 99.2°; respiration, 24.

There is a large, diffuse, pulsating, expansile tumor of entire right buttock. Tumor is soft, compressible, and thrill and bruit made out over entirety. Movements of knee and right hip are free but painful (Fig. 1).

Roentgen-ray examination, September 4, 1921: Right hip and pelvis negative to any bone change. Large, round, soft, tissue shadow, 20 cm. in diameter, seen enveloping entire right buttock (Fig. 2).

Laboratory examinations: (1) Urine negative except for trace of albumin and an occasional hyalin and granular cast. (2) Blood group (Morse technic), Type 2. (3) Wassermann reaction (acetone insoluble antigen) 2 plus; cholesterin antigen negative. (4) White blood cells, 6200; hemoglobin, 75 per cent.

Diagnosis. Spontaneous aneurysm of right buttock, probably of gluteal artery; compensating mitral regurgitation.

Patient was very weak and in poor general physical condition, not having slept or eaten much for the last two weeks. Pain was so severe that she had to have morphin every four to six hours for relief of excessive pain. She slept but little and her mental condition did not seem to be at all good. She talked at random and complained of various types of pain in her right leg, and cries out constantly for someone to rub the calf of the right leg.

She was under observation in the hospital for one week with abundant food, fluids and rest. We expected to ligate the internal iliac artery and possibly do an intrasaccular suture (endoaneurysmorrhaphy), as described by Matas and effectively demonstrated in one case by Robert Abbe, and then if necessary do a blood transfusion. At the end of one week her general condition was somewhat better and the tumor was still apparently enlarging, so an immediate operation was advised.

Operation, September 10, 1921. In moderate Trendelenburg position, and through a right rectus incision with the intestines well packed off, the right internal iliac artery was exposed without difficulty. It was found to be as large as one's little finger and a thrill was elicited by the examining finger. By pressure upon it the pulsation in the tumor was stopped. The external iliac was normal in size, as was the common iliac. Two heavy silk ligatures were tied around the internal iliac one-half inch from its origin and another heavy silk ligature one-fourth inch lower down. The posterior peritoneum was sutured over the vessels. The appendix was seen and it appeared to be normal and was not removed. The wound was closed without drainage. In order to facilitate the agglutination of the wall of the aneurysmal sac it was emptied by firm pressure and a large pad was very tightly strapped over it and firmly held in place by adhesive plaster.

After the operation the pulse was 104 and of good volume.

FIG. 1.—Gluteal aneurysm treated by ligation internal iliac artery.

FIG. 2.—Cirsoid aneurysm of the scalp.

The pain in the right leg was absent for the first time in over two weeks.

Convalescence was uneventful. Temperature, which was 104° the day following operation, gradually subsided to normal on the sixth day. She required morphin only occasionally for the first few days for the usual abdominal discomfort. There was never a return of the excruciating pain in the right leg. The pulsation of the tumor, which previously lifted the body perceptibly from the bed, became quiet and the bruit and thrill disappeared entirely.

It had been planned to do an obliterative endoaneurysmorrhaphy as a second stage following the ligation of the internal iliac; but when the aneurysmal tumor was so completely stilled by the former procedure it did not seem necessary to do anything additional. This belief was strengthened by the opinion and advice of Dr. Matas, that the aneurysmorrhaphy would be unnecessary after the ligation. It is agreed that the wonderful newer methods introduced by Matas in the treatment of aneurysms are ideal in an artery in continuity, but in a location like the buttock a deliberate incision into such an enormous blood tumor as this case without preliminary circulatory control seemed rashness.

The patient left the hospital on the nineteenth day, and has been up and about on crutches since that time, gaining in weight and strength and is entirely free of pain. When relieved of the intolerable pain, her mental condition returned to its normal state of tranquillity and sweetness.

II. Cirsoid Aneurysm of the Scalp.

This curious, rare, disfiguring and often dangerous affection was classified by Virchow among the bloodvessel tumors, and has been called "Rankemangiom," or "angioma arteriale racemosum," or aneurysm by anastomosis. The uncertainty regarding its morbid anatomy and etiology makes it a malady which needs further study.

According to Matas[11] the process shows itself as a subcutaneous swelling made up of a pulsating network of arterial sinuses, from which radiate pulsating vessels that can be distinguished as individual trunks, whether originally containing arterial or venous blood is not clear. It is supposed to start as a widening or dilating of the branches of a particular arterial tree. It most commonly affects the vessels of the face and scalp; next the forearm and hand. The widening and thickening and lengthening of the arteries extend ultimately to the finest capillary. Traumatism or pregnancy has been known to play a part in exciting the transformation of the vessels. Lexer is of the opinion that some developmental fault which affects the particular vascular territory concerned lies at the bottom of the process.

One makes the diagnosis almost instantly by sight, while the touch confirms the impression of the arterial character of the vermiform tangle of dilated bloodvessels. A systolic blow and thrill and a systolic murmur may be elicited and pressure on no one point obliterates the bruit completely.

The complications are many. In addition to the distressing thrill and pulsation, there may be subjective symptoms of noises in the head, dizziness or fainting spells. There may be pain from inflammatory involvement of adjacent nerves. Ulcerations of the overlying skin may develop with severe resulting infection and possible fatal hemorrhage.

No form of treatment has been always successful. Ligation of the main arteries has not been satisfactory and gives only temporary relief. The injection of alcohol or boiling water to produce solidification of the vessels and thrombosis is not without danger. Wyeth reports a case involving half of the scalp cured by the injection of boiling water. At repeated operations, parts of the scalp bearing the aneurysm have been removed, allowing the wound to heal before each operation. Another method was to excise the scalp bearing the aneurysm and later fill in the gap with skin graft. The

best method, however, is complete extirpation with ligation of all the radiating trunks. It is the ideal method, but, unfortunately, often impossible where much of the scalp is affected.

Case Report No. A 11564. Female, aged twenty-five years. Pulsating tumor of left scalp.

Ten years ago she noticed a small, soft tumor, the size of the end of her finger, in left parietal region near median line and posterior to occipitoparietal suture. No history of injury antedated the appearance of the tumor. There was no pain, but it was slightly tender on pressure. Never gave any trouble, but gradually increased in size until now about size of flattened goose-egg, with tortuous branches spreading out to left zygomatic arch, on left, and across median line to opposite parietal region and posteriorly toward occipital region. For past two or three years has had pain of a more or less dull, throbbing character, especially marked in the eyes and in frontal and occipital regions. It is usually worse when lying down. Notices throbbing more when she reads or sews much. Occasionally has a feeling as if something is pulling her hair. Has used only simple remedies for headaches.

General health otherwise has been excellent.

Menstrual history, normal. Married five years; one child, three years of age; no miscarriages. Had measles, mumps, whooping cough, chicken-pox and malaria when a child. Had influenza about three years ago. Gives no history of venereal infections or injury. Had a small fatty tumor removed from in front of right ear three years ago.

Father, mother, three brothers, two sisters, husband and one child living and well. Father has a fatty tumor of neck. One brother has a deformity of lip. Negative for tuberculoses, cancer or nervousness.

Examination. General physical examination was negative except for the scalp. The left anterior half of the scalp is

covered with a large tumor-like aggregation of dilated, tortuous, pulsating, bluish-tinted, elevated bloodvessels. Just to left of median line is larger mass, size of child's hand, with tortuous pulsating branches radiating out to left zygomatic arch and across median line to right parietal region and posterior toward occipital region. It feels like a bunch of worms or a varicocele, except it is pulsatile, expansile, and a thrill is felt and a bruit heard. Pressure on external carotid artery lessened but did not stop pulsation. Roentgen ray of head is negative for erosions along longitudinal sinus. Laboratory examination of blood and urine was negative.

Diagnosis: Cirsoid aneurysm of scalp (Fig. 3).

Operation. April 1, 1921. Patient was placed face downward with her head at the end of table and with a tight hemostatic elastic band around head.

1. Transverse incision, inch by inch, from left middle temporal region to right parietal region, well in hairline was made. The incision made through skin and epicranial aponeurosis skirting the growth posteriorly, making a slight U-shaped flap with the base anterior.

2. The flap was reflected from the cranium forward, requiring many hemostats and ligatures because of free anastomosis with the deep vessels. The field was comparatively dry and hemostasis good so far. Entire tumor of bloodvessels excised *en masse* from underneath. Anterior temporal artery ligated, posterior right occipital and anterior right temporal arteries greatly enlarged but not ligated. Wound sutured. Oozing from left end of wound controlled by iodoform gauze. One small tube used for drainage.

There was slight oozing for twenty-four hours, but this was not alarming. The eyes and face were somewhat swollen next day, which increased, and the eyes were closed and face and neck were edematous on the third and fourth days. This gradually disappeared under boric acid and external applications of heat. Patient was dismissed from the hospital, on the sixteenth day, with wound practically

healed except a small area above her left ear. Eight months after operation there is no evidence of return of trouble and the patient is entirely free of throbbing headaches (Fig. 4).

Bibliography.

1. Abbee, Robert: Annals of Surg., 1908, vol. xlviii.
2. Crisp: Quoted by Matas.
3. D'Antona: Archiv. Internal Chir., 1903–1904, vol. i.
4. Delbet: Quoted from Matas.
5. Frost, Harold M.: Lancet, December 2, 1916, vol. ii, p. 942.
6. Goldammer: Deutsche Ztschr. f. Chir., 1919, 148.
7. Gillette: Annals of Surg., 1909, vol. xlviii.
8. Krische: Deutsche Ztschr. f. Chir., Bd. 144, 1, 1–2.
9. Lexer: Deutsche Ztschr. f. Chir., 1916, Bd. 135.
10. Matas: Keen Surgery, vol. v, p. 340–342.
11. Matas: Keen Surgery, vol. iii, p. 25–26.
12. Ott, William C.: Annals of Surg., 1921.
13. Rupp: Inaug. Dissert., Konigsberg, 1907.

DISCUSSION OF THE PAPERS OF DRS. LAROQUE, WINSLOW, PAYNE, MASON, TALLEY AND HAGGARD

Dr. Thomas S. Cullen, Baltimore, Md.—I have been deeply interested in the subject of thrombosis of the mesenteric vessels. We have had 3 cases in the gynecologic department at the Johns Hopkins Hospital—2 recovered and 1 died.

I had 1 case at the Church Home and Infirmary developing six weeks after removal of a large multilocular cystadenoma of the ovary. The patient was apparently well, and while stooping over in the garden felt something give way in the abdomen.

She was brought one hundred and thirty miles to the hospital and the abdomen was opened. I found all but two feet of the small intestine brown, dry and leathery. Nothing could be done. She lived ten days after operation, in all thirteen days after the symptoms first developed.

Dr. Leo Brady, resident gynecologist in the Johns Hopkins Hospital, has gathered together all the mesenteric thrombosis cases that have been observed in the hospital. His most interesting paper is soon to appear.

Dr. A. J. Buist, Charleston, S. C.—I wish to report a case of thrombosis of the mesentery following an attempt at reduction of a hernia. This patient was seen by a friend of mine. She was fifty-five years of age and was deaf and dumb. She had a large femoral hernia that had repeatedly come down. On this occasion he was called to reduce it and he used considerable force in taxis. The next day he was called to see her because she had some symptoms of obstruction. She was nauseated, was vomiting and had a repeated desire to go to stool. We considered the possibility of reduction *en masse* of that hernia and also the possibility of intussusception, because later that day she began to have bloody stools. That night we operated and found she had thrombosis of the mesentery, with the line of demarcation just as clearly marked as the doctor has shown the line of demarcation in his case, going absolutely up to the ileum. About eighteen inches away from that the bowel was resected. There was not room enough to make an end-to-end anastomosis. A lateral anastomosis between the severed end of the ileum and the cecum was made. The patient recovered.

Dr. F. G. DuBose, Selma, Ala.—I should like to report in connection with Dr. La Roque's paper a case of ligation similar to his in which we had the same results and incidentally report one case of immediate ligation following a bullet wound of both the external iliac artery and vein and another case of the femoral within a day or so thereafter. In both of the other cases we had a recovery.

The patient, R. R., negro, thirty years of age, in December, 1918, was shot through the left thigh with a 38-caliber pistol, the bullet going through and through. The entrance was at about the junction of the upper third with the lower two-thirds, slightly to the right of the midline. Hemorrhage was controlled by dressing with pressure bandage; the wound healed without any infection. About six weeks after injury a definite pulsation and thrill could be felt over this area, which was diagnosed as an aneurysm. About three months afterward ulcers began to appear around his ankles and shin.

The patient was lost sight of until October, 1920. At this time his pulsation over the thigh had markedly increased. His leg was swollen from his thigh down, with several ulcers around his ankles. The Wassermann was negative. On November 1, 1920, he was operated on. A large arteriovenous aneurysm of the femoral artery and vein was found. This aneurysm was about the size of an orange. An endoeneurysmorrhaphy was done. The day following the operation his leg and foot became markedly swollen; no pulsation could be felt in the ankle. However, the foot remained warm. This swelling gradually subsided. The patient was discharged from the hospital on the eighteenth day, but six weeks afterward pulsation was again felt in his thigh, being practically as great as the first. February 10, 1921, the vessels were exposed, double ligation was done, the aneurysmal sac removed and the wound closed. The patient was discharged from the hospital two weeks after operation. At the present time the left leg is somewhat larger than the right. There are no ulcers or sores on his leg. No pulsation can be felt. The swelling in his leg can be controlled by an elastic stocking.

Dr. James E. Thompson, Galveston, Texas.—There has been so much material brought out in the discussions this afternoon that one could speak longer than five minutes on any one of the papers presented.

I have been particularly interested in the papers of Dr. La Roque and Dr. Haggard. Arterial surgery has got to be rewritten. We have neglected this for many years, and within the last five or six years we have begun to revive a great deal of knowledge that was quite commonly understood twenty-five years ago. As a matter of fact it is all a matter of understanding the collateral circulation. There is no reason at all why Dr. La Roque's case should not have recovered if the collateral circulation was in good condition and had escaped injury. If the anastomosis between the median and lateral circumflex arteries below with the branches of the hypogastric (gluteal and obturator especially) and the circumflex iliacs above is all right, and if the surgeon knows that they are all right he might go ahead and sleep comfortably. Unfortunately we are never absolutely certain. It is probably about as dangerous a place in the thigh for an artery to be injured as we can find. The older surgeons taught that ligature of

the common femoral artery above the origin of the profunda was not a good operation. They were right. With a ligature in that situation they got below the origin of the inferior epigastric artery and above that of the profunda artery; and unless the anastomosis was satisfactory the blood could not circulate; but if the anastomosis is good, blood will flow into the circumflex arteries at their periphery and will pass along their channels into the profunda and so into the femoral artery below the ligature. It is much more dangerous for this reason to obliterate the femoral and the origin of the profunda as well. This prevents the blood from passing into the femoral trunk. It must then pass downward along the descending branches of the circumflex arteries and join the chain below, consisting of the arteria genu suprema and the upper articular arteries. A similar dangerous arterial region is found in the brachial artery at its origin. The first large branch given off from the brachial artery is the profunda humeri. This runs along the radial (musculospiral) groove along with the radial (musculospiral) nerve. It is a large vessel and is quite capable of carrying enough blood to the arm to keep it alive if the brachial artery is ligatured below its origin. But ligature of the brachial above its origin cuts off this important branch. Then the anastomotic channels are the lowest branches of the axillary above (anterior and posterior circumflex and subscapular) and the muscular branches derived from the profunda humeri and the main brachial artery below. They are usually adequate. If, however, we add to obliteration of the artery in this situation, almost complete severance of the collateral circulation which will follow division of the long head of the triceps gangrene is almost inevitable. I have seen it follow knife wounds where the triceps and brachial artery were divided simultaneously. The same line of reasoning that we have followed in the consideration of wounds of the femoral and profunda arteries holds in this situation. A wound of the brachial and the profunda humeri is a much more serious accident than a single wound of the brachial above the origin of the profunda.

Dr. Haggard's case reminds me of one that I saw a few years ago which demonstrated in a striking manner how failure to cure an aneurysm may be traced to a collateral circulation which was too adequate. I tied the left common iliac artery for the cure of a large aneurysm of the external iliac artery.

The aneurysm was so large that it filled the left lower abdominal cavity and the left side of the pelvis. A ligature was placed around the abdominal artery but was not tied, because at the last moment an attempt to isolate the beginning of the left common iliac trunk was successful and we were able to pass a ligature around it. Pulsation ceased at once and for almost two weeks no sign of pulsation was present, then feeble pulsation reappeared and became gradually stronger until at the end of two months the aneurysm was as large and vigorous as before. About six months afterward the patient presented himself again and we found an enormous aneurysm occupying the whole pelvic cavity and the whole lower abdomen. Fifteen years previously the left femoral artery had been severed by a bullet which had divided it just below the inguinal ligament. Consequently there was no femoral artery. Deep pressure just above Poupart's ligament, directed under the lower margin of the aneurysmal tumor, stopped all pulsation. Thinking that the pulsation was kept up by a large aberrant obturator artery an attempt was made to find the bloodvessel and to place a ligature on it. The attempt was absolutely unsuccessful. After a prolonged dissection under the lower edge of the aneurysmal sac I was unable to find the point of entry of the vessel. The patient refused to allow me to ligature the abdominal aorta. He left the hospital unimproved.

There is no doubt that blood was brought to the aneurysm by a large open anastomotic vessel from the hypogastric artery (internal iliac) of the opposite side. It is a source of regret that I did not ligature the abdominal aorta at the first operation.

Dr. Jere L. Crook, Jackson, Tenn.—I desire to mention a case which I reported at the meeting of the Southern Medical Association in Louisville in which there was a complete severance from a razor cut of the external carotid artery and jugular vein. Practically every structure in the neck was divided except the esophagus, trachea and spinal column. The patient, a negro, ran several steps after being struck with the razor with the blood spurting several feet in front of him and then fell unconscious. He was brought to my sanatorium completely comatose with a barely perceptible pulse. I was called before he arrived there and reached the sanatorium almost at the same time, having ordered my nurse to prepare an irrigator with normal saline solution for immediate use. The arteries and veins of the neck were not bleeding, as the patient was

in a profound syncope and blood-pressure was so slight that there was not force enough to drive the remaining blood out of the vessels. I immediately started transfusion with normal salt solution in the median cephalic vein, and placing a nurse in charge of this I then caught both ends of the main vessels with hemostats, and as others would bleed they were likewise caught. I carefully ligated all the vessels and sutured the structures that were severed. During the progress of the operation the patient was given forty-two ounces of normal salt solution and at the conclusion he was fully conscious and able to speak. Fearing that there was not sufficient blood and that the normal salt solution would not suffice for the patient's needs I began to search for a donor for blood transfusion. Five of his intimate friends who were present in the building were asked for the blood, but all refused. His sister, who was three months pregnant, volunteered, and as soon as the blood test demonstrated that the bloods would fuse I secured one pint of blood from the sister and injected it into the patient's veins, after which he reacted and recovered. Two months after leaving the hospital he developed typhoid fever with a very severe attack, but finally survived it and is now in perfect health. The two points that are of special interest in this case are, first, the fact that the patient with a complete severance of the carotid artery and jugular vein lived long enough to get to the hospital, and the second point of interest is that while waiting for a donor of real blood his life was saved by the immediate use of a large amount of saline solution; however this only gave him a temporary lease on life, and the use of a pint of real blood was finally necessary to tide him over. I believe the normal salt solution should be used primarily always, as it will save life until one has time to secure real blood.

Dr. E. S. Judd, Rochester, Minn.—I want to show two or three slides of bloodvessel cases. This (showing slide) was a case of large cirsoid aneurysm in an old man who had had evidences of aneurysm for many years and had been advised not to have an operation. A few days before he came to the hospital one of the vessels in the top of the scalp had ruptured with severe hemorrhage. The hemorrhage recurred two or three times, so that it seemed necessary to operate. His condition was none too good. The first operation was performed under local anesthesia. I ligated the right external carotid

artery, which reduced the pulsation considerably. Six days later I ligated the left external. After that he was in a peculiar condition until pulsation disappeared, but three or four days after he had a severe pain in the scalp and it was necessary to give him morphin. About the sixth day after the second ligation, under local anesthesia, I made an incision very much as Dr. Haggard did in his case, starting from the bridge of the nose and passing back to the occiput. I turned the scalp down on each side and enucleated the vessels without any difficulty. There was nothing but clotted blood in the vessels. This slide shows the man several months after the operation.

Dr. Joseph A. Danna, New Orleans, La.—We in New Orleans are very much interested in the subject of aneurysm, and so many points have been brought out by the papers read that I could not say what I should like to say if I had the time to do it.

I want to make a plea for conservatism in bloodvessel surgery. I do not like to hear of an aneurysm of the femoral, the axillary or any other accessible place in which one has to ligate above and below and excise the sac. I find it is not necessary to do that, and as an evidence of what one can do with conservatism, and in order to bring out the points raised by someone during the discussion, I am going to cite a case I had which was similar to Dr. Haggard's. I have had 2 cases similar to the 2 cases which he has had, and I will describe the method of attack:

In the gluteal case I made a small incision which was large enough to get my finger in and I distinctly made out the point from which the blood was pouring into the aneurysm. I did not do it before in the axillary case that I got into, thinking I was going into an abscess. I felt encouraged to try it in this gluteal case, feeling the amount of blood going into the aneurysm could not be large. I slit the thing open quickly and retracted it quickly so that the patient would not lose much blood. I put my finger on the large bleeding spot and the aneurysm collapsed. I opened quickly the sac with scissors, put in silk sutures in the large opening and the smaller openings I closed with stitches, putting in a couple of sutures and a little wick of gauze, and that was all.

My temporal case I saw in a rather peculiar way. She was a nurse in Hotel Dieu. I had done a cranioplasty on a case for hernia of the brain on a patient with a very good result.

This nurse had nursed that patient. One day she said to me, "I have got the same thing your patient had in room so and so." I felt over her hair a pulsating mass and casually remarked, "I believe you have got the same thing." She informed me that she received an injury when a child and I thought she had a pulsation due to a cerebral hernia. I told her I would operate, but I was not a bit anxious to do so. One day she came to me and said that Dr. So-and-So said she had an aneurysm. She had a large pulsating mass which was due to an aneurysm, and I said that if this is what it is I will fix you tomorrow. I told her that I could operate under local anesthesia. I did not examine her as thoroughly as we do people with whom we are not familiar. She was prepared for operation under local anesthesia. After shaving the head we saw big vessels radiating in all directions and pulsating with each motion. I brought her into the operating room a second time, and in examining the thing and feeling around I found that by pressure I could stop the pulsation of the whole thing. This is interesting, I said, and I am going to make a little hole in that thing in order to get my finger in there. I did so and introduced my finger so as to get it on the sensitive spot and stop the pulsation. I put three sutures in the hole which communicated between the artery and vein. I opened the vein and put three linen sutures in this communication and closed the two ends of the vein also with sutures, and she made an uneventful recovery.

I want to report also a case of through-and-through gunshot wound of the common femoral artery and vein which also was sutured. I sutured four openings. When one gets an injury of the bloodvessel wall the lining of the endothelium spreads from the bloodvessel wall into whatever cavity there may be adjacent to the lumen of the bloodvessel and where you have no cavity which covers the edges of your vessel. I had no difficulty in this particular man in closing with fine sutures each one of these four openings, two in the artery and two in the vein, and kept the man in the hospital for three months to see that he was all right. He had no trouble.

While on this subject I want to mention something which I saw in an Italian medical journal. It was the report of a case by a man given before a surgical society meeting. The case was very much like Dr. Winslow's, in which he got into an aneurysmal cavity and he found it difficult to catch the

vessel, the end of the vessel, and clamp it because of the arteriosclerotic condition. He packed, filled the lumen of the carotid for a distance of 5 cm. with iodoform gauze and filled the lumen at the upper end of the carotid in the same way and got a good result. I know of one instance that I am sure would have gotten well if I had known that particular trick in a case of aneurysm of the femoral, the patient having had a recurrence after a Matas operation which had been done by someone else. In this case I applied ligature after ligature three times, one after another, above the point of the aneurysm, and each time the ligature sloughed through. This last idea is a good thing to remember when one gets into an aneurysm cavity and does not know what to do. If he packs the openings far enough it will take care of the hemorrhage.

Dr. John Wesley Long, Greensboro, N. C.—Two recent cases that happened to be in the Wesley Long Hospital at the same time are illustrative: One patient, a policeman, was shot through the lower end of the femur with a 35-caliber bullet, which also passed through the popliteal space and severed the popliteal vein. When brought into the hospital he was bleeding very profusely. We made a free incision, carefully dissecting the popliteal space. Finding the severed vein we ligated both ends. Temporary drainage was used and in ten days the patient was able to leave the hospital.

Within twenty-four hours of the case I have mentioned an officer was shot through the midthigh, the bullet severing the femoral artery. The patient was carried thirty-five miles in a "machine" to the hospital. He was profoundly shocked from the loss of blood. Indeed, he was so shocked that I did not dare give him an anesthetic, but we first transfused him with whole blood. The young man was pulseless for two or three hours, but finally we got enough blood in him so that his pulse could be felt. Making a long incision and dissecting rapidly we found the femoral artery cut through three-quarters of its circumference, only one side being intact. We ligated both ends of the severed artery. But we did not ligate the vein, and I must confess I do not see why we should have ligated the vein. The patient made a prompt recovery.

A third case occurred a few years ago. It was one of mesenteric thrombosis that developed about four days after a splenectomy which we had done for Banti's disease. About the fourth day acute abdominal obstructive symptoms supervened.

At operation we found four feet of the small intestine thrombosed, the thrombosis extending deeply into the mesenteric vessels. We made a wide dissection, incised fully four feet of the intestine, making out sufficient mesentery to get the thrombosed vessels and did an end-to-end anastomosis. The patient left the hospital in the usual time.

Dr. F. W. Parham, New Orleans, La.—I want to say a few words with reference to Dr. Haggard's paper. Some years ago I met with an aneurysm of the gluteal artery similar to that shown by Dr. Haggard, feeling that the surgical rule demanded that we should tie the artery as near to the aneurysm as possible. I went to the deadhouse and practised on a number of cadavers. By using a colored mixture of plaster of Paris thrown into the internal iliac artery I was able to distend the gluteal artery and find it easily. I became so expert that I could find and tie the artery at the notch easily in seven and a half minutes. However, when I cut down on the aneurysm it was quite a different affair. The aneurysm overlaid the artery in such a way that I could not easily identify it and had to resort to the ligature of the internal iliac.

So far as the remarks of Dr. Danna are concerned I should like to say, if you make a small opening in such an aneurysm as that described by Dr. Haggard into which you may thrust your finger you are all right if you can find the gluteal opening; but if you do not you are liable to be in a pretty bad fix. It would be better to open the abdomen, secure temporarily the internal iliac artery and then open the sac and do the suturing by the Matas method. I think that would be the best procedure and you would not have then cut off the circulation in the area supplied by the internal iliac artery, and, besides, there would be less danger of recurrence later on. If one can control the supply of blood to the aneurysmal sac it is a comparatively safe procedure to open the aneurysm deliberately, suture the upper opening and do an obliterative aneurysmorrhaphy after the method of Matas.

In regard to the paper of Dr. Mason, I have been much interested in that subject. I have had several cases of thrombosis, one a very interesting case of a man who was about to leave on a ship for Havana, when he was taken ill and one of my friends was called to see him on the ship. He was taken with sudden abdominal pain without previous illness. He

was brought to the infirmary. I opened him up and found at once that apparently the whole small intestine was gangrenous.

Another case was that of a lady I saw one evening suffering with violent intestinal colic accompanied with very great distention of the abdomen and retching. 1 told her there was intestinal obstruction and something ought to be done. We got her up to the infirmary. She had had symptoms for only twenty-four hours and had not complained previously, so that I was at a loss to locate the cause of the obstruction. Her condition was such at this time that I thought it was not justifiable to give a general anesthetic. So I made an incision under local anesthesia and at once it became apparent that there was nothing to be done, as the whole intestine seemed gangrenous. I at once closed the incision. She died within a few hours and an autopsy showed occlusion of the mesenteric artery. These are cases in which we are absolutely at a loss to do anything. In one case I thought I could see the gangrene actually develop as I went along with resection and fortunately was able to stop before I had gone too far.

Dr. Mason (closing the discussion on his part).—In cases of severe, persistent and uncontrollable abdominal pain it has always been taught that exploration is indicated. After hearing the discussion of these cases I think this ought to be more definitely impressed upon us. We cannot definitely diagnose the cases that belong to the fulminating type. In the slowly developing cases of the chronic or subacute type the internist has some opportunity for differential diagnosis, but in the case of severe, sudden, overwhelming abdominal attack the sooner the surgeon explores the better. In a small percentage of these cases early resection has been successful. There have been, according to Klein, successful resections reported since 1894. This discussion has added three successful cases besides the one I have reported. There is no stronger indication for insisting on exploration than a severe uncontrollable abdominal pain.

Dr. Haggard (closing on his part).—I considered very carefully the wisdom of making a temporary ligation of the internal iliac and then performing an obliterative aneurysmorrhaphy of the gluteal sac immediately. On account of the frailness and general unsuitability of the patient for surgery

I divided the operation into two stages. After the ligation the sac became greatly reduced in size and the pulsation, thrill and bruit ceased absolutely. In view of the very considerable proportion of permanent cures by ligation only it seemed wise to defer any attack upon the aneurysm proper. This view was strengthened and adopted after the advice of Dr. Matas, who was kind enough to give me the benefit of his opinion. I am not unmindful of the possibility of recurrence.

Dr. La Roque (closing the discussion).—I have ligated the internal iliac artery in a number of cases and have found no ill effects. I do not see why we should avoid ligating the internal iliac artery.

THE TREATMENT OF FIBROID TUMORS

By Charles N. Cowden, M.D.
Nashville, Tenn.

(Read by title.)

My paper is in the form of a question mark, in order that we may get from the combined experience and knowledge of a company of live men, some definite conclusions that will enable us to find out or determine just where we are upon one of the most familiar problems that is met with, almost daily, in the routine of the gynecologist. It is almost inexcusable to venture a paper upon this threadbare subject, but the literature that had been accepted by the medical profession as the last word upon the treatment of fibroids a few years ago, compared with some of the writings upon the same subject of today, will disclose a vast change for the better or worse in the handling of these cases.

A note of dissatisfaction or a suspicion of doubt seems to have crept into the minds of the overzealous enthusiast who is ever ready to carry to extremes any fad or fancy before it has been tried in the crucible of mature experience. It is somewhat difficult to get a line on these men, as some are for it today and reverses his statement tomorrow. A few are still enthusiastic, some have slowed down, some have applied the brakes and many of them are even backpeddling. Then again we fail to record our failures in many instances for fear of undue criticism or various other reasons and much valuable negative information is lost.

I am going to quote freely from different writers upon this subject without stopping to give any one of them credit. They are all live, up-to-date men, and if you will follow me closely you may possibly recognize some of your own theories, experiences or observations set forth in my paper. I claim nothing original at all in it. You may call it a plagiarized article, and it is, but I think that it will serve well my purpose. I only wish to get the subject before you in a manner that will elicit the widest and frankest discussion.

The treatment of fibroids of the uterus a few years ago was one of the procedures upon which surgeons had agreed. The operation was one of the standardized classics, accepted and practised by all, after which the word finale had been written. The technic had been refined and perfected to simplicity itself, and the end-results both present and remote were all that could be asked for, even in the hands of, I might say, the average surgeon. It consisted of two procedures, supravaginal hysterectomy and myomectomy in a small number of selected cases. The mortality from these operations was practically nil. One operator reported over 150 cases without a death and the morbidity leaves nothing better to be desired.

Time has only increased our belief in the permanent and satisfactory results to be obtained from the operation, and few if any objections have ever been found against it. It is age-old, time-tried and perhaps does less harm to the patient than any other cure that has ever been suggested. It is an operation of election, both as to time and condition of your patient, and much can be done in the way of preparation that will lessen the danger and diminish the postoperative discomfort. It affords an opportunity to inspect all of the pelvic organs and determine what is best to do to give radical relief and also give an opportunity to examine the contents of the abdominal cavity, if there be any suspected pathology in any of the different organs of the viscera. The patient, freed from all of her pathology, reacts promptly

and her convalescence is both rapid and permanent in practically 100 per cent of these cases, unless some complicating condition exists that cannot be remedied.

The organs that are not injured can be left to carry on their function, and though not functioning normally, they do much to mitigate the menopausal symptoms into which your patient is ushered. Supravaginal hysterectomy or myomectomy, it seems, has all of the eliments of success in combating or curing fibroids of the uterus, and the results obtained challenges any enthusiast who is trying to substitute in their stead any new untried method or those that have been tested over only a limited period of time. I venture the statement that in the whole range of gynecologic operations there is none dealing with an equally serious condition that is attended with so little loss of life, such a small degree of morbidity, with so large a percentage of permanent results, and is fraught with so much satisfaction and beneficial results, to both patient and surgeon, as supravaginal hysterectomy for fibroid tumor of the uterus. I believe it has been and is today the accepted. This is my position upon the question, and I think that it will be a long time before such a tenable procedure will be surplanted or abandoned.

Arrayed against this is the statement made a few years ago in Atlantic City by one of our leading men. "That it was a surgical crime to operate upon any case of uterine fibroids," but this statement, I think, will have to be modified, just as the one that he made in Chicago, "That all cases of cancer could be cured if he had radium in a sufficient quantity." But he failed to tell whether it would take 1 mg. or a ton.

Again we read a few days ago a statement from another one of our most prominent men. "That radium as a therapeutic remedy should be withdrawn from our armamentarium or it should be used in a very limited field." This leaves us surgeons that are followers of our leaders in the midst

of a dilemma, not knowing which way to turn. Between these two extremes surely there are some conservative opinions and experiences of some of the many operators that will lead us aright; but it seems they have not as yet crystalized their experience into generally accepted truths. After many years of experience with it in the hands of many men, after hundreds of original articles in the medical press, even the monthly issues of some special journals dealing with its wonderful effects, endless discussions, report after report of long series of cases, etc., they have failed to fix its value with any degree of definiteness. There are so many things in which they do not agree, such, for instance, as to the dosage, time to repeat, thickness of filters, distance from the tissues, individual susceptibility, etc., until we are confused with the multiplicity of the formulas and methods. It is just a bit humorous to some of us when the men with 100 mg. or more of the precious metal claims that nothing less will do the work, while the ones with small amounts claim that it is the small, oft-repeated dose that is the least dangerous and most effective.

The man with the larger amount even claims that these smaller doses oftentimes stimulate tumor growth and do more harm than good, and the little fellow claims that a large dose causes liquefaction changes or true necrosis in the tumor, and these must be taken care of by gradual absorption, and in many cases these degenerative changes are toxic biproducts that seriously influence the patient's health. The patients body becomes a kind of a charnel house to dispose of the debris left over from the effects of the radiated tumor tissues. That this condition is true has been proved many times by the removal of a tumor mass by hysterectomy after the use of radium and noting the rapid rebound to health that immediately follows.

One class of radiologists claims that under roentgen-ray or radium therapy there is none of the shock that usually attends the operation for fibroids. Another class says that

it is oftentimes attended with considerable physical distress and call it, "Rontgen-Kater," which has been described and studied by many radiologists. It consists of general prostration or weakness, nausea and vomiting, accompanied by headache, palpitation, great nervousness and sometimes severe pain. Could you describe shock any better? This condition, while not occurring in all cases, sometimes lasts from six to sixty hours, and varies in degree from mild to a very grave condition, as noted by a few radiologists. Take into account the fact that each series of treatments ordinarily extends over a period of two to five days and each case receives from three to ten treatments, and some of them more, it occurs to me that during all of these months filled with dread and uncertainty upon the part of the patient while taking these radium seances, that it is a great deal more than she would have suffered from a radical operation attended, for a few days even, with a violent reaction, which is not often the case, as can be vertified by all operators.

Some radiologists claim that patients suffer no inconvenience whatever, but the fact is most of them suffer some kind of discomforture or distress either in making the application or from its effects, and perhaps more than one-third of these suffers inconvenience for a period equivalent to or in excess of that experienced from a laparotomy. Then after all these treatments, extending usually over a period of many months, the important question arises, Is the tumor cured? How can you tell when you have effected a cure? All of the most enthusiastic radiologists except one only reports cures in from 46.4 up to 56.2, while one claims 83 per cent cures. What constitutes a cure? Is it only sufficient to control the hemorrhage to call it a cure, or is it only necessary to stop the growth of the tumor? or should we be expected to cause it to disappear before this claim can be made?

They tell us that it is successful in a large number of

myoma cases by causing a permanent amenorrhea, and in many of the cases it will cause a shrinkage of the tumor. One radiologist, in a series of 380 cases, the size of the tumor was noted with the following results: Reduced in size but not to normal in 57 per cent; marked reduction in 13 per cent; entire disappearance of tumor only 5 per cent; unaltered in 21 per cent; and in 5 cases the tumor actually increased in size.

In another series of cases reported, examined from three months to two and one-half years after treatment, there had been a reduction in the size of the tumor, varying from complete to almost complete disappearance in 18 per cent of the cases and to one-half of the original size in nearly 50 per cent of the others, leaving about 30 per cent with no increase in size, and a few cases had actually increased. All these cases may be systematically cured and give no further evidence of their presence, but I believe that I would have a difficult task to convince the patient of the fact, when she could herself feel the tumor mass, although it was very much reduced in size and gave her no discomfort whatever. The psychology of the thing would be enough to make an invalid of her, as she would live in mortal apprehension or fear of a return.

Just how the radium brings about these retrogressive changes is not altogether settled. Does the ray have a direct selective action on the myoma tissue or cells? or is it the chief influence exerted by the degenerative changes in the ovaries? Radiation of the pelvis, as believed by most of them, does effect the fibroid tissues and the endometrium to a slight degree, but diminution of the tumor and the cessation of the hemorrhage are brought about largely through the effects upon ovarian tissues, that results in a state of complete cessation of ovarian function. The ovary atrophies and perishes away and the patient is at once plunged into the midst of all the bizarre and protean manifestations of a premature menopause; just as if complete

ovariotomy had been done. That control of hemorrhage and reduction of tumors come only after the establishment of amenorrhea has been noticed by all.

Here surgery conserves the ovaries, or at least one of them, even a small piece of one whenever possible, and this is found to be possible in at least one-third of the cases. In some of these myomectomy followed by child-bearing is vouchsafed to the patient and even a faint hope of a possibility of becoming a mother in the future is exceedingly gratifying to them. Castration by destroying all of the ovarian tissue is nothing short of a calamity in every woman's life. For when it is done she realizes that her wonderful productive organs are not so vitalized and attuned, so fit and perfect that they respond to the most subtle influence that ever swept through the soul of human kind, in the ecstatic, overwhelming delight in the mysterious fulfilment of nature's first law, that is the crowning glory of her mission here upon this earth. Radium does this for her in every case before it begins to affect only in a slight degree the tumor mass. The surgeon sometimes has no other alternative, but it is always done after a careful search for some small piece of normal ovarian tissue that can be left.

One point upon which they nearly all agree and most of them emphasize is to the contraindications to the use of radium in the treatment of fibroids. The tumor must be small and not of rapid growth, uncomplicated and not associated with any coincident, inflammatory disease of the appendages or any cystic tumors of the ovaries. One or two enthusiasts, on the other hand, asserts that radium may be efficient in the treatment of pyosalpinx or pelvic infections.

Lateral pain in connection with fibroids suggests either inflammatory conditions or pressure upon neighboring organs, and is also a contraindication to its use. Early malignancy, and this is not an unheard of complication, constitutes a very decided drawback to radium therapy.

Some claim that as high as 7 per cent of myomas exhibit malignant degeneration, one writer reporting a case in a fibroid that had been treated four years with radium.

They lay special stress upon a correct diagnosis of these cases and insist that these cases should be carefully selected. But who among us can make the diagnosis? In a series of 3500 cases associated diseases were found in more than one-third of them, including degenerative changes in the tumors, a multiplicity of lesions of the appendages, and in a few malignancy. Another reports 501 cases, in which were found 405 patients with ovarian cysts, abscess of the broad ligament, tuboövarian abscess, pyosalpinx and ectopic gestation, in none of which could the radium have possibly cured the trouble, and in practically all of which failure to correct the lesions would have resulted in permanent disability of the patient or the loss of her life.

If we will all go back only a short period in our daily work we will recall many gross errors in pelvic diagnosis, and many of the unsuccessful cases in radium therapy they claim are based upon incorrect diagnosis. I want to state if the tumor has existed for any great length of time, or has grown to be of any great size, there will be only a few that will be free from some of the associated complications enumerated. This leaves only an exceedingly small percentage of the cases that are amenable to the radium therapy taking their own contraindications as a guide.

An important after-result that is sometimes noticed is a possible continuation or a reappearance of the bleeding. This bleeding may appear within a few hours after the removal of the radium and may persists for days and sometimes weeks. The amount of blood varies from a steady, profuse flow to an occasional scanty showing. One radiologist claims to have encountered this troublesome bleeding in a great many of his cases, and some of them continue from two to six and eight weeks. This treatment is sometimes followed by a profuse, irritating, leuchorreal discharge.

It is usually when the radium had caused a complete cessation of the hemorrhage. It also continues for weeks and months and no kind of treatment seems to influence it in any way. The discharge becomes foul and chemically irritating and soon results into an annoying vaginitis, and is slow to yield to treatment.

To a nervous, apprehensive patient who has not been previously forewarned about these possible conditions, and confidently expecting an instantaneous cure, the continuation of the bleeding or the appearance of the profuse leucorrheal discharge comes as a distinct disappointment to her, and the doctor finds himself in an embarrassing predicament in explaining away the cause of the situation.

Another phase of the question to be reckoned is the many and varied complications that sometimes attend its use, sometimes the hemorrhage is not controlled. Severe pain, proctitis, rectal tenesmus, diarrhea, vesical tenesmus, cystitis, narrowing of the vagina, burns, fistulas, skin irritations, ulcers that require long months to heal, and some late results, such as untoward pathologic changes in the blood or a development of a state of extreme nervousness. All from time to time have been noticed by the different observers and occur quite irrespective of the question whether the tumor has or has not been cured.

Then after all we have to consider the effects of the presence of a mass of mutilated, degenerated tumor tissue that is left in the pelvic cavity. It is too short a time since the beginning of the use of radium in these cases to foretell the final chapter as to its remote effects, and time alone can solve it. The question naturally arises: If a patient is not better off without a uterus or with only the cervix left than she would be with the remnant of this organ that had been entirely burned away or destroyed and left in her pelvis for some possible unknown future pathologic developments. It seems to me we are leaving behind some very

undesirable tissue that might give no end of trouble at some time in the future.

In view of all these facts obtained, from the experience of the men who endorse the use of radium for the treatment of fibroids in comparison with the definite results that follow hysterectomy, what are the conclusions to be drawn in respect to their individual merit? Should they be adjuncts, one to the other, or are they rivals for supremacy in the treatment in benign growths? Is there a certain type best suited to one or to the other method. If so, what are the definite indications or contraindications to their use? Has the investigator in the use of radium become so expert that he can say with definiteness that here is a case that should be treated with radium, and this tumor of such size and bulk should have so much dosage, at different times, and you get as certain results and as little morbidity as you may expect from a hysterectomy? Until this can be done I think the place for radium in this field is very limited if not questionable. The possibilities of radium for real harm have not been sufficiently exploited in the literature, because men shrink from reporting their bad results. Therefore, it is the duty of those men who are using radium to spread the propaganda of caution and insist that only men of great experience in handling it should use it. From my very limited experience, and from the literature of the subject, I am convinced that radium and the roentgen ray have only a very very limited place in the treatment of fibroid tumors.

I would have you remember in your discussion that my paper is upon fibroid tumors and not upon myopathic hemorrhage or malignancy.

SPECIAL POINTS IN THE SURGERY OF THE STOMACH

By George W. Crile, M.D.
Cleveland, Ohio

The following points are based upon the experience of my associates and myself in 754 operations on the stomach for ulcer or cancer.

Incision. The vertical incision has the following limitation: Should the operative field involve the lesser curvature the vertical incision gives an indifferent exposure unless the stomach is drawn outward. If the stomach is adherent, this manipulation is difficult, if not impossible, for the surgeon and very unfavorable to the patient. For this reason, unless the stomach is prolapsed, we now use routinely a transverse incision which exposes the stomach along its long axis far better than does the vertical incision. The transverse incision is of especial value when gastro-enterostomy is performed in cases of inoperable cancer for the purpose of supplying temporary relief, because it permits the patient to get up earlier without running the risk of breaking open the wound. The tardy repair of abdominal wounds in cases of inoperable cancer is well known and the danger of breaking open the wound is particularly augmented when there is vomiting. The stress of vomiting is transverse and the transverse incision in these cases minimizes the danger from this cause, as does the Mayo incision for umbilical hernia.

In closing a transverse incision it is not necessary to take any precautions in regard to the muscle and fascia relation. We use the stitch devised by Dr. Smead, of Toledo, which was first shown to me by Dr. J. M. T. Finney, of Baltimore. From without inward this stitch passes successively through the fascia, muscle, posterior sheath and peritoneum, and returns from within outward through the same structures in the inverse relation, *i. e.*, the peritoneum, posterior sheath, muscle and fascia; the needle is then carried over to pick up the fascia between the distal and proximal side. This makes a very secure and easily placed stitch.

Type of Operation. In cases of complete obstruction of the pylorus, if the patient is excessively emaciated and near the border of starvation, and particularly if the obstruction is due to a massive ulcer, water and nourishment may be administered through a catheter inserted into the jejunum by Witzel's method. This operation may be performed under analgesia and local anesthesia, and is an excellent expedient in these cases. I have found, however, that this operation must be very carefully performed in order to avoid chemical irritation of the skin by any overflow of the intestinal juices. Should such an overflow occur, mutton tallow is apparently a good protection against the resultant irritation.

In cases in which the condition is not so desperate as to require the above procedure, but still is so grave that a resection cannot safely be undertaken, a simple gastroenterostomy will provide for the partial restoration of the food and water equilibrium. After this has been established the mass itself may be removed at a second operation. Besides the immediate protection of the patient against operative death, this graded operation has an additional advantage. In five different instances in which I supposed we were dealing with cancers, the great ulcer mass disappeared entirely after the simple gastroenterostomy. Lilienthal has made a like observation. Undoubtedly,

had these patients been in a little better condition, so that I should have felt warranted in proceeding with the major operation, an unnecessary resection would have been made.

The Management of the Mesocolon in Posterior Gastrojejunostomy. Some years ago, in several cases in which because of intractable vomiting we had reopened the incision, we found that the loop of the jejunum was obstructed by the exudation and contractions around the opening in the mesocolon. In one of these cases I made an anastomosis between the ascending and descending limbs of the jujenum and saved the patient, and in another instance I lost a patient under similar conditions. Since that experience we have always made a larger opening through the mesocolon, and when possible have cut out a real window. We also take pains to tack back the mesocolon opening upon the wall of the stomach some distance from the gastrojejunostomy. In this way the stomach projects through the gastrojejunostomy for a considerable distance and there remains no possibility of an obstruction of the jejunum.

Closure of the Stomach. We use a through-and-through stitch—the cobbler stitch—which we have found effectively prevents both leakage and bleeding. In our series of cases in which this method of closure has been used we have had no instance of postoperative bleeding. The suture line would probably be sufficiently strong in itself to require no reinforcement, but I have never felt a sufficient amount of confidence in the uniform quality of catgut to risk it, and therefore we always reinforce the catgut with light silk interrupted stitches.

General Points in Operations for Ulcer. In cases of stomach ulcer we resect the ulcer and suture the stomach in the opposite direction by Ochsner's method, so as to restore the lumen.

We find it makes no difference in which direction the anastomosis is directed, whether with the current or against the current. The main point is to have it mechanically

easy. W. J. Mayo long ago pointed out that the fundamental requirement of gastroenterostomy is mechanical accuracy. In our experience the point of election is opposite the lowest level of the greater curvature. In our cases, in which we elected a point near the pylorus, as advised by Hartman, we found that the functional result was not as good, probably on account of the excessive mobility of the stomach at that point.

We have lately employed a sleeve resection byMoynihan's method, using a Y-anastomosis, with results which have been satisfactory up to the present date.

As to the occurrence of postoperative peptic ulcer, I have the impression that it depends largely upon the postoperative care of the patient. My experience indicates that peptic ulcer is less likely to occur after Finney's pyloroplasty than after a gastrojejunostomy. This is in accord with Horsley's opinion that pyloroplasty is the method of choice whenever the location of the ulcer makes it possible. The chief causative factor is of chemical origin, though occasionally, as W. J. Mayo has pointed out, it is undoubtedly excited by unabsorbed stitches. Duodenal ulcers are more strikingly relieved by operation than are gastric ulcers.

In cases of acute perforation from gastric ulcer the patient is operated upon at the earliest possible moment, merely a closure by suture being made. Apparently this is sufficient, for, as a rule, perforating ulcers are self-cured.

General Technic in Operations on Bad-risk Patients. The management and treatment of bad-risk patients is based on the probabilities rather than on the state of the patient at the moment, just as in preventive medicine prophylactic measures are applied *in advance of the emergency*. In preventive surgery, as in preventive medicine, we can never know whether the preventive measures were essential to the recovery of the individual case; we only know that the possible emergency did not develop. Moreover, we know that, even if the fatal outcome might not

have occurred without the preventive measures, morbidity has been lessened and convalescence correspondingly promoted by their application.

In extreme cases it may be that no striking improvement can be secured; but it should be borne in mind that even a slight gain may establish the outcome, and the patient is entitled to even the smallest advantage, which no one can say may not mean the difference between life and death.

As a *prophylactic* precaution, therefore, the following routine is rigidly enforced in all bad-risk cases.

1. *Before Operation.* Water, 2000-4000 cc, by Bartlett's method of hypodermoclysis, if anemia is marked; transfusion of blood, repeated if required.

2. *Operation.* Divided operation; nitrous oxid-oxygen only to stage of analgesia, with local anesthesia; briefest and slightest possible exposure; sharp knife dissection; avoidance of traction; wide excision of tumor; round needles for stomach suture; cobbler stitch; lightly tied sutures.

3. *Postoperative.* Warmth; transfusion of blood; maintenance of nutritional and water balance; prompt use of stomach tube in case of vomiting; prolonged—a year or more—control of ulcer cases.

Results. By the employment of these general measures, which are always strictly adapted to the indications in the individual case, the range of operability has been extended postoperative morbidity has been minimized, and the mortality of operations upon the stomach, including gastroenterostomies for ulcer and resections for cancer, has been reduced to 3.2 per cent.

BLEEDING ULCER OF THE DUODENUM ASSOCIATED WITH CHOLECYSTITIS

By E. Starr Judd, M.D.
Rochester, Minn.

Within the past year I have operated on 4 patients with bleeding duodenal ulcers in whom the pathologic condition was more extensive in the gall-bladder than in the duodenum. In each case the duodenal ulcer could be demonstrated easily and in 1 case it was of long standing, as evidenced by the amount of scar tissue. A very severe grade of cholecystitis was also present in all of these cases. The gall-bladders of the 4 patients were very much alike, being rather larger than normal, with thick, edematous walls. They were not compressible, because of the inflammatory deposits in the tissues. They contained stones and infected bile in each instance. I believe that their mucous membranes were completely destroyed and that they were functionless.

These cases of cholecystitis and duodenal ulcer were also very similar clinically. The chief symptom in each case was gastrointestinal hemorrhage, usually very severe, occurring at intervals of a few months. Two of the patients arrived for treatment just after hemorrhage; 1 had had a severe hemorrhage on the train the night before. The 2 patients had a hemoglobin of about 30 per cent on first examination. All 4 patients complained of mild dyspepsia which was easily controlled by regulation of the diet and proper management. The massive hemorrhages occurred

when least expected, often when the patients had been symptom-free for a long time. None of the 4 had ever had severe pain. It was impossible to elicit a history of gallstone colic or any other symptom suggestive of a disease of the gall-bladder. In 1 patient, an elderly man who had had very severe hemorrhages at intervals for many years, and who had a great deal of scar tissue in the wall of the duodenum, the lumen had been greatly reduced. Following a gastroenterostomy, some years previously, he had been relieved for a time, but the attacks of hemorrhage returned. A severe hemorrhage occurred just before his arrival at the Clinic, and operation was postponed for several weeks in order to allow him to recover. He had marked arteriosclerosis, which may have accounted for the apparent ease of the bleeding. Four weeks later, when the operation was performed, there was no evidence of a break in the mucous membrane of the duodenum, or of vessel erosion, as possible sources of bleeding. There was a great deal of scar tissue in the wall of the duodenum, inflammation in the tissues of the gall-bladder, and a definite inflammatory process throughout the liver. Hepatitis had progressed almost to the stage of cirrhosis. There was no jaundice or ascites.

The findings at operation on the other 3 patients differed somewhat. There was definite ulceration on the anterior part of the duodenum, away from the larger vessels, and it appeared quite unimportant. There was no induration or deformity of the duodenal lumen. It is possible that there were other and deeper ulcers which were not found, but I believe that these small areas of duodenitis in the region of the duodenal cap were the only lesions in the duodenum. There was extensive hepatitis and cholecystitis, with stones and infected bile in the gall-bladder. While tissue was not removed from the liver for microscopic examination, we nevertheless were convinced that the hepatitis was the type usually seen in association with cholecystitis and that it had not reached the stage of cirrhosis.

The findings in these 4 patients impressed us with the importance of infections in the gall-bladder as a possible etiologic factor in cases of gastrointestinal bleeding. A definite lesion in the duodenum was found in every instance and undoubtedly was the point from which bleeding occurred. The hemorrhages were of the massive type, such as usually occur from the pancreaticoduodenal artery, and yet in each case it was quite definitely shown that none of the larger vessels could be involved in the ulcerations.

There is sufficient evidence to show that gastrointestinal bleeding may occur as a result of infection in the gall-bladder and liver. Balfour mentions a case in which bleeding ceased after the removal of a chronically inflamed gall-bladder. Deaver reports profuse bleeding in hemorrhagic infections of the biliary tract. In 1 of his cases blood reached the duodenum through the common duct and then regurgitated to the stomach; the primary cause was streptococcic cholecystitis. Kelling, in an article on the relation between cholelithiasis and ulcer of the duodenum, in speaking of the differential diagnosis between gall-bladder disease and ulcer of the duodenum, says that occult blood with duodenal ulcer may mean nothing; it may also come from infections in the gall-bladder.

Some months ago I operated on a patient in whom hemorrhage occurred regularly every few days. Ulcer could not be found, but cholecystitis with stones, and extensive scarring and edema of the liver, which oozed a great deal as the gall-bladder was removed, were noted. The history of this patient is as follows:

CASE I (A374792).—Mrs. W. R. A., aged fifty-three years, came to the Clinic October 31, 1921, because of gastric hemorrhage. The history of trouble began nineteen years before with indigestion and upper abdominal cramps. The pain passed "through and through" the right hypochondrium and lasted two or three hours. Relief was

obtained by soda or by hypodermic injections of morphin. After the pain had subsided the entire abdomen was tender. The patient had never been jaundiced. About ten years before she began to have attacks of gas and distress with belching two or three hours after meals; this was aggravated by certain foods, and was relieved by soda. In the past three years the distress had increased and usually commenced about one hour after meals. She was often awakened at night by the pain. After eating apples, a few months before, she was awakened by severe acute indigestion which required a hypodermic. The next day she noticed black stool and vomited small amounts of coffee-ground material. Shortly after this she was treated for ulcer and was pronounced cured. One month later she had a second gastrointestinal hemorrhage, and since that time bleeding spells occurred at regular intervals. She had lost thirty pounds in weight.

Examination revealed systolic blood-pressure 135 and diastolic 85. The hemoglobin was 60 per cent. Roentgen-ray examination of the gastrointestinal tract was negative

Operation was performed November 19, 1921. Hepatitis was very marked, the liver being almost cirrhotic. There was also chronic cholecystitis with stones, inflammation of the appendix, and edema in the tissues at the pyloric end of the stomach. The ascending colon was bound down in a manner to suggest an old abscess. It was thought possible there might be a lesion causing the intestinal bleeding, but none was found. The gall-bladder and appendix were removed. The patient vomited a little bloody material on one or two occasions after the operation, but very shortly signs of improvement were noted. Although the time since operation is short, the patient is gaining and apparently is in better condition than she had been for a long time. Bleeding has entirely stopped.

Several years ago Crispin, in the Clinic, studied a series of cases of gall-bladder disease, and found a history of gastro-

intestinal bleeding in about 5 per cent. Communication with these patients revealed, in nearly every instance, that, after the gall-bladder had been attended to, bleeding ceased. In a recent review of all the cases of gall-bladder disease observed in the Clinic in 1918 and 1919 we found that hemorrhage was mentioned as a symptom in 2.43 per cent.

Rankin has recently reviewed the histories of 55 patients in the Clinic with blood in the vomitus, in the stool, or in both, but in whom a pathologic condition was found in the gall-bladder at operation. The average age of these patients was thirty-nine and one-half years, the oldest being sixty-seven and the youngest eighteen. There were thirty-six females and nineteen males, a ratio of almost two to one. In the majority of males diagnosis had been made of gastric or duodenal ulcer, but in many instances these diagnoses had not been verified by the roentgen ray. The average duration of symptoms was twelve years, the shortest duration two months. Several patients had had symptoms for an indefinite period.

Thirty-seven patients gave a history of more or less typical gall-bladder disease; that is, attacks of epigastric colic, and nausea, vomiting, and residual tenderness, belching of gas, and some qualitative food distress. In 9 patients the history was so suggestive of ulcer that a clinical diangosis of ulcer was made in spite of negative roentgen-ray findings. In 7 cases it was only possible to elicit an indefinite history of an upper abdominal condition which might have been considered as disease of the gall-bladder or stomach or as reflex in character.

A clinical diagnosis was made of cholecystitis in 20 cases, cholecystitis with stones in 15, ulcer in 9, appendicitis in 4, and indeterminate in 7. Blood appeared in the vomitus in 32 patients, in the stool in 18, and in both vomitus and stool in 5. It is difficult to judge at all accurately of the amount of bleeding, as it was stated only that the hemorrhage varied in amount from a few ounces to severe bleeding producing anemia.

Operations of drainage and removal of stones from the gall-bladder had been done elsewhere in three instances, and the appendix had been removed in seven instances. In 13 patients constipation was so marked that they had constant recourse to cathartics.

TABLE OPERATIVE FINDINGS IN FIFTY-FIVE CASES

Grade.	Cholecystitis.	Appendicitis.
1	16	17
2	25	11
3	10	11
4	4	1

The discrepancy in the total number of cases of appendicitis is due to the fact that seven patients had had appendectomies previously; moreover, at the time of operation at the Clinic, removal of the appendix was considered unwise or unnecessary in several instances, either because of the condition of the organ or of the patient. Cholecystectomy was performed in 52 cases, choledochotomy in 4, cholecystostomy in 1, and appendectomy in 39. The pathologic condition in the gall-bladder was reported either chronic or acute.

From the evidence of other observers and from our own experience it may be concluded that hemorrhage into the stomach or intestine may occur when the lesion is in the gall-bladder or liver. It is difficult to determine at what point bleeding occurs or whether it is from several points.

Cases of cholecystitis in which there is occasional bleeding into the stomach or intestine should be grouped with the toxic cases of gastrointestinal bleeding. Undoubtedly the bleeding is due to the effect of toxins from the infected gall-bladder or liver. It is generally known how severe hemorrhages may be in deeply jaundiced patients; sometimes bleeding occurs from all the surfaces of the mucous membrane, and is probably largely because of a changed condition of the blood, due to the presence of bile. It is

possible, however, that some other change or disturbance of the functions of the liver may be the factor that results in changes in the blood or other tissues, thus allowing toxic bleeding. As our knowledge of these conditions increases, we look more and more to disorders of the liver to account for the obscure cases. It is possible that an ulcer of the duodenum may have been present in our 55 cases and not recognized, but since the bleeding ceased in most instances after operation on the gall-bladder it is fair to assume that the gall-bladder was the important factor.

Obscure gastrointestinal bleeding occurs with many conditions. Obscure bleeding from esophageal varices, particularly when associated with the toxic state in cirrhosis of the liver, has been widely discussed. There may be severe bleeding in cases of anemia associated with enlargement of the spleen and liver, and in certain cases of renal disease; and hypertension, endocarditis, arteriosclerosis, aneurysm, and tabes dorsalis may be causes of obscure gastrointestinal hemorrhage. In any event, all obscure hemorrhages occurring in the stomach or intestines are not the result of infections in the gall-bladder; they may be the result of disturbances in the liver which have been brought about by any one of these causes.

Moschcowitz reported 4 cases of massive hemorrhage from the stomach without demonstrable ulcer, in which operation failed to reveal lesions in the stomach or any other condition to account for the bleeding. The patients all recovered after repeated transfusions, and Moschcowitz was inclined to believe their condition to be the *exulceratio simplex* decribed by Dieulafoy, who in 2 cases had not found a demonstrable ulcer or lesion of any kind in examining the outside of the stomach; but in each instance, on opening the stomach and brushing away the clots, a small abrasion of the mucous membrane which extended into the submucosa was found. In 1 of the cases Dieulafoy was able to show a small open arteriole at the bottom of the small break in the mucosa and

submucosa. This probably constitutes a true, although minute and superficial, ulcer, and demonstrates that a great deal of bleeding may occur from a very small opening in the tissue. I believe it should not be assumed that this type of lesion accounts for all the cases of obscure bleeding; if it did, the condition would be reported more often at necropsy.

Apparently there are three regions in which similar obscure bleeding occurs. Bleeding from the stomach or intestine, when the mucous membrane is intact, may be comparable to bleeding from the nose when the mucous membrane of the nose and throat is intact, and is also comparable to bleeding from the kidney which is designated essential hematuria. In these three conditions the blood escapes from apparently normal mucous membrane. Although the tissues are swollen and edematous, they are intact and there is no way to explain the bleeding except by oozing. Although the evidence is a little uncertain, I believe the cause is generally considered to be toxemia, probably originating from any one of a number of sources and producing the same effect.

Many times the wrong diagnosis has been made through the error of thinking that if bleeding were associated with dyspepsia there must be ulcer in the stomach or duodenum. If blood was vomited the diagnosis seemed positive, but we now regard this symptom, and that of blood from the bowels, as occurring in association with other conditions in a certain percentage of cases. An abdominal exploration does not seem justified on the evidence of the bleeding alone, as the source of the difficulty may be more remote. However, since infections in the gall-bladder, biliary tract, and liver are undoubtedly often responsible, I believe that in operating on a patient with these symptoms the biliary tract should be carefully investigated, whether or not there is an ulcer. It has been shown that 20 per cent of patients with duodenal ulcer have noticeable bleeding. Most of

these patients are completely relieved of all their symptoms by gastroenterostomy. In from about 10 to 15 per cent of such patients bleeding recurs at some time after the operation. In most of these the bleeding may be the result of latent or revived infection in the duodenum at the site of the ulcer. It is possible, however, that it may sometimes be due to infection in the gall-bladder, and that it might not have occurred if an associated infection in the gall-bladder had been recognized at the time of the operation for the ulcer. In operating on the stomach or duodenum it has been our custom to examine the gall-bladder and ducts, but I believe it is possible to overlook inflammation in the gall-bladder unless we recognize the lesser degrees of inflammation that may occur.

We have an abundance of evidence to show that cholecystitis and hepatitis may be the source of the infection which results in bleeding, and I think we also have evidence which suggests that cholecystitis may be the source of the infection causing this symptom even in the presence of ulcer of the stomach or of the duodenum.

Report of Four Cases of Bleeding Ulcer of the Duodenum Associated with Cholecystitis. Case I (A364189).—Mr. F. A. H., aged sixty-one years, came to the Clinic July 9, 1921, complaining of having had hunger pains for the last two or three years, which disappeared on eating. He was supposedly cured by a gastroenterologist; but about a month before our examination he began to lose his appetite and his old discomfort returned. He noticed that his stools were dark-colored for several days. On two occasions he had had hemorrhage from the stomach, once with momentary loss of consciousness and once for five minutes. He had been on a liquid diet for some time, and during the two weeks before examination had lost six pounds.

Examination revealed blood-pressure of 175 systolic and 100 diastolic. The prostate was somewhat enlarged, and

the phenolsulphonephthalein return on two occasions was 30 and 35 per cent. Hemoglobin was 43 per cent. Roentgen-ray examination confirmed the presence of a duodenal ulcer.

At operation, July 16, 1921, an ulcer of the duodenum was found on the anterior wall about 1.5 cm. below the pylorus, this was causing obstruction and dilatation of the stomach. The gall-bladder was infected and contained multiple stones. Gastro-enterostomy was performed and the gall-bladder removed. The patient's convalescence was uneventful and he has been entirely well thus far.

Case II (A325048).—Mr. H. Q., aged fifty-eight years, came to the Clinic July 15, 1920. He had always been well until three years before, when he passed dark stools and was very weak afterward. Two years later he again passed considerable blood by bowel. He was put on a diet and improved rapidly. In March, 1920, while in Russia, he had another attack of severe bleeding from the bowel. He became very weak and his hemoglobin dropped to 30 per cent. For about three weeks preceding the second attack he had had epigastric pain. Since his last attack he had had considerable dyspnea and asthmatic-like attacks.

Examination revealed an anemic man weighing 208 pounds, somewhat less than his normal weight. The systolic blood-pressure was 108, the diastolic 84. There was a blowing systolic murmur all over the chest and carotids. Urinalysis revealed albumin, casts, and pus. The hemoglobin was 38 per cent, coagulation time five minutes, and bleeding time one-half minute. Roentgenograms showed an ulcer of the duodenum. The electrocardiographic examination revealed ventricular preponderance 3, chronic myocarditis, and aortic stenosis. The teeth and tonsils were septic.

At operation, August 6, 1920, a diffuse superficial ulceration on the anterior wall of the duodenum of the duodenitis type was found. The ulcer started about 1.25 cm. below

the pylorus and extended for 5 cm.; there was very little if any induration. The gall-bladder was definitely inflamed and contained stones; the liver was inflamed. A posterior gastro-enterostomy and a cholecystectomy were performed. The patient's convalescence was normal and he left the hospital in about two weeks. Several weeks later his tonsils were removed and his teeth treated. He recovered completely.

Case III (A355215).—Mr. F. D. McC., aged forty-one years, came to the Clinic April 12, 1921. He complained chiefly of gas in the stomach and epigastric distress which had been intermittent for four years. The attacks came usually during the spring and fall and lasted for from three weeks to three months. At one time he was free from trouble for two years. The pain usually came on about five o'clock in the afternoon and then again from one to three in the morning. Relief was obtained by food and soda. He had his first hemorrhage from the stomach in 1919 and the second in 1921, when he also passed dark stools.

We found the patient in good condition except for his anemia. The hemoglobin was 42 per cent (about two weeks after his last hemorrhage). Roentgenograms revealed an ulcer of the duodenum.

Operation was performed April 20, 1921. On exposing the duodenum an old edematous ulcer was found on the anterior wall of the duodenum, which was attached under the liver. The gall-bladder was definitely inflamed and contained stones. The appendix was also subacutely inflamed. A posterior gastro-enterostomy was made and the gall-bladder and appendix removed. The patient recovered completely.

Case IV (A355365).—Mr. F. S. K., aged fifty-nine years, came to the Clinic April 14, 1921, complaining of recurrent hemorrhages from the stomach and bowel. The history

of his trouble started thirty-three years before, when he first had attacks of epigastric pain. The attacks lasted for from one to six months; he was then free from trouble for from one to two months, during which time he felt perfectly well. Epigastric pain began from two to three hours after eating and often wakened him at night. Food and soda afforded complete relief. He did not vomit during the attacks of pain, but had much belching of gas. These spells persisted intermittently for years. Nine years before he passed tarry stools for five or six days and became very weak. Shortly after this he was operated on and a duodenal ulcer found. A gastro-enterostomy was done elsewhere. The patient was relieved for eight months, and again had trouble, but the attacks were shorter and less frequent than before the operation. They were relieved by soda and food. After the operation he had hemorrhages about once in six months, as evidenced by tarry stools, weakness, dizziness, and dyspnea. He was treated medically on a number of occasions and was relieved of his symptoms. While on the train on his way to the Clinic he had passed profuse tarry stools; this was followed by weakness and dizziness. Increasing pain had persisted for many months. He had lost fifteen pounds in weight in the last four months.

At the time of our examination he was anemic and weighed 147 pounds. The systolic blood-pressure was 180, the diastolic 110. An occasional hyaline cast was found in the urine. His hemoglobin varied from 50 to 60 per cent. The gastric contents showed total acids 32, free acids 20. The combined phenolsuphonephthalein return was 55 per cent in two hours. The roentgenograms revealed a deformity of the duodenal bulb and a free gastro-enterostomy. Some time was required in raising his general resistance as much as possible for operation.

At operation, May 3, 1921, an ulcer was found about one and one-half inches below the pylorus, which had constricted the duodenum until it was only a small cord and

would apparently permit little or no fluid to pass. This was ligated with two silk ligatures which were placed one above and one below the center of the contracting scar. Examination of the old gastro-enterostomy showed it to be in good condition, with a large opening and no evidence of ulcer in the margin. The gall-bladder was definitely inflamed and contained one small stone. The liver was edematous and hardened, with scars on the surface. The ulcerated area was occluded by silk ligatures and the gall-bladder then removed. Convalescence was very satisfactory for the first four days after the operation, when the patient had a sudden attack of abdominal pain, intermittent in character and not localized. On account of the arteriosclerosis we thought for a time that the pain might be anginal. The pain was completely relieved by a hypodermic of morphin, but returned again in a few hours, and the pulse became more rapid.

Leakage was suspected and the abdominal wound opened. The general abdominal cavity was in good condition, but there was a small pocket beside the duodenum containing duodenal contents which had leaked from an area of perforation through the old scar tissue where the ulcer had been. The pocket was walled off and free drainage established. The patient gradually grew weaker and died on the night of the sixth day.

When the duodenum was first examined in this case it seemed best to excise the scar tissue. At least it was considered absolutely necessary to destroy the ulcerated area to obviate the possibility of a return of hemorrhage. When the duodenum was partly mobilized, we realized that further procedure was not feasible, because the dissection of the scar tissue led into the pancreas, common and pancreatic ducts. The idea of removing the ulcer was abandoned, and we attempted to place ligatures to control the blood-vessels to the ulcerated area. Possibly this reduced the circulation so that necrosis resulted; at least there was some

change in the perforation on the fourth day after a normal convalescence to that time.

Necropsy showed that there was no true ulceration in the duodenum; its lumen was greatly reduced, but it was entirely covered by mucous membrane. While this patient had a rather marked arteriosclerosis and a large ulcerating area in the duodenum, cholecystitis with stones and hepatitis, I am, nevertheless, inclined to believe that if he had recovered after cholecystectomy he would probably have been relieved of his intestinal hemorrhages.

Bibliography

1. Balfour, D. C.: Surgical Treatment in the Bleeding Type of Gastric and Duodenal Ulcer, Jour. Am. Med. Assn., 1919, lxxiii, 571–575.

2. Crispin, E. L.: Toxic Gastric Hemorrhage, California State Jour. Med., 1917, xv, 308–312.

3. Deaver, J. B.: Gastric Hemorrhage, Surg., Gynec. and Obst., 1914, xviii, 294–299.

4. Dieulafoy, G.: Exulcératio simplex; l'intervention chirurgicale dans des hématémèses foudroyantes consécutives à exulcération simple de l'estomac, Bull. de l'Acad. de méd., 1898, 3s., xxxix, 49–84.

5. Kelling, G.: Die Beziehungen zwischen Cholelithiasis und ulcus Duodeni, Archiv. f. Verdauungskr., 1921, xxiii, 63–68.

6. Moschcowitz, A. V.: Massive Hemorrhages from the Stomach without Demonstrable Ulcer, Am. Jour. Med. Sci., 1916, clii, 714–727.

THE CHOICE OF OPERATIONS FOR DUODENAL ULCER

By Le Grand Guerry, M.D.
Columbia, S. C.

To the best of my knowledge and belief we are curing approximately 75 per cent of duodenal ulcers by simple gastroenterostomy. In some clinics the proportion of cures may be higher and in some lower than 75 per cent, but the general average, I believe, is fairly represented by the above figure. By a cured case we mean a case given complete symptomatic relief by operation. To my thinking this proportion of uncured cases, 25 per cent of the total, is much too high, for one must remember that 25 per cent of uncured cases of duodenal ulcer in the aggregate represents a very great volume of unrelieved patients; consequently any effort made and any reason given by which the proportion of cured patients will be increased should be carefully considered. In our opinion at least, one of the things responsible is the fact that many of us have formularized our thinking on the question of duodenal ulcer; by which I mean to say we have come to look on duodenal ulcer and gastroenterostomy as convertible terms. You see what I mean at once: A patient has duodenal ulcer; therefore we must do gastroenterostomy. This is bad logic and poorer surgery. It would be unfair to make this statement in a harshly critical way, for many of us, we believe, have fallen down just here, myself included. The operation of gastroenterostomy for this condition has been placed in

a position of such prominence, and deservedly so, by so many men that we have come to believe that this is the best way to relieve all cases of duodenal ulcer.

Sufficient time has elapsed now, however, and we are beginning to get the end-results. It is becoming increasingly clear that here, as elsewhere, there is a definite place for the proper choice of methods. The whole object of this paper revolves around this point, namely, a judicious selection of method to meet the indications in each individual case.

Two cases just here will serve as a concrete illustration of what we are trying to get at. Two years ago I saw a surgeon, one of the leading men in our country, operate on two cases for duodenal ulcer during one morning's clinic. On both of these patients he himself had operated about two years before for duodenal ulcer, doing a simple gastroenterostomy; both patients had been given temporary relief and after the above length of time had recurrence of symptoms; hence the second operation. When case No. 1 was operated on, the ulcer was found clear and definite on the anterior surface of the duodenal cap; the ulcer apparently was unaffected in any way by the previous operation and the gastroenterostomy opening was completely closed. The ulcer was then excised and a straight closure of the duodenum made; the gastroenterostomy opening was taken down. In case No. 2 the ulcer was practically identical with case No. 1 and was managed in the same way. The gastroenterostomy stoma, however, in the second case was perfectly patent and normal; this opening was also taken down. The work was done by a man who puts any criticism of technical performance completely aside, yet I am convinced that excision of the ulcers in the first instance would have been better surgery and the surgeon in charge made this point immediately. There are amongst my own cases two that are practically identical. Additional illustrations from other sources would serve no useful purpose; these are ample to prove that there is increasing room for a

proper selection of method to meet the indications in each individual case. z

The lessen to be learned from the above cases seems to me perfectly clear and definite, namely, that there are cases of duodenal ulcer in which gastroenterostomy alone does not suffice.

Balfour, in a recent paper, has touched upon a point which we believe has been little thought of and yet must surely be the fundamental principle in the treatment of all ulcers, duodenal and gastric as well, namely, mechanical and physiological rest to the inflamed part.

John Hilton in his truly great book, on *Rest and Pain*, lays bare the principle that must govern successful treatment of all ulcers. In speaking of the process of the repair of wounds in primitive man he says, "Pain was made the prime agent. Under injury, pain suggested the necessity of, and, indeed, compelled him to seek for rest. Every deviation from this necessary state of rest brought with it, through pain, the admonition that he was straying from the condition essential to his restoration. He must have observed with astonishment the breaking asunder of the newly formed tissue or the steady development into normal structure which occurred in exact accordance with the disturbance or rest to the parts, which the sense of pain had enabled him to regulate so accurately and to employ so beneficially for his own personal relief and comfort."

What I have here endeavored to inculcate is that "growth and repair bear an exact relation to due physiological rest, local and general." This principle applies fundamentally to the cure of all ulcers. The method which comprehends this fact will endure; the one which does not cannot endure. For in a very real sense there is no difference between ulcer of the leg, ulcer of the rectum, or ulcer of the duodenum. The same principle underlies the process of growth and repair in both animal and vegetable kingdoms.

Just as sleep is man's greatest earthly solace, bringing

physiological rest to his tired body and brain, so mechanical and physiological rest to the local ulcer area is the one great essential of repair. Let us remember, also, that just as the body chemistry is changed during the process of physiological rest to a condition of normal alkalinity, so the chemistry of the local ulcer condition will be likewise changed by mechanical and physiological rest applied to the local area. Any method of operating that applies this principle truly will be successful. With this principle carried out we will gain three primary points:

1. Mechanical rest.
2. Physiological rest.
3. There will be the altered chemistry and this in turn means a healed ulcer.

With this brief statement of the general principles that should underlie the proper treatment of duodenal ulcer, at least as we understand them, we are ready to consider very briefly the choice of methods when dealing in a surgical way with ulcers in this location.

1. It is evident from statistics from many sources that gastroenterostomy will relieve permanently 75 per cent of all cases operated on. Gastroenterostomy is an excellent method; it is simple to perform, has an extensive field of application, and the results are good. It is a method to be carefully considered:

(*a*) In stenosis of the pylorus.

(*b*) In ulcers that encroach on the lumen of the pylorus.

(*c*) In a highly placed and inaccessible stomach.

(*d*) In perforating duodenal ulcer, where we wish to add gastroenterostomy to simple closure, although pyloroplasty can be used in the presence of perforating ulcer.

(*e*) When for one reason or another the duodenum cannot be mobilized. In all ulcers where bleeding is a complication direct attack must be made on the ulcer itself.

2. I must confess to a strong liking for the Finney pyloroplasty and in my personal work this is the operation of choice whenever the duodenum can be mobilized. This method appeals to me so strongly because it seems to meet more nearly than any other the principles mentioned above.

In a paper by Finney and Friedenwald, published in *Surgery, Gynecology and Obstretrics*, March, 1914, in which the authors review 100 cases of pyloroplasty, we find 5 deaths immediately following operation; 13 cases that were not heard from. Of the 82 cases definitely tabulated, there were perfectly satisfactory end-results in 93.9 per cent of the cases. This is getting the percentage of permanent cures around where it ought to be.

According to Finney, the only contraindication to the operation of pyloroplasty is inability to mobilize the duodenum. When adhesions are very dense and there is thickening and infiltration about the pylorus, mobilization of the duodenum is quite difficult and should not be attempted. To me, at least, the dividing line between gastroenterostomy and pyloroplasty rests in large part on this question of mobilization of the duodenum. To quote from Finnèy's article in *Surgery, Gynecology and Obstrtrics:* "The special advantages of this operative proceedure lie in its affording the opportunity to excise all ulcers in the anterior walls of the stomach or duodenum after direct inspection of the part affected; also the application of treatment to ulcers situated in the posterior walls. It does not greatly disturb the normal relation between the stomach and intestines, as in the case in other operations."

Our knowledge of the physiology and mechanics of what happens to the food in the process of preparation of digestion that goes on in the stomach shows conclusively, we think, that when food first enters the stomach it undergoes a very thorough process of liquefaction and chymification. During the above process it is thoroughly mixed with gastric

juice. This is nature's preparation of the food for what happens to it in the duodenum.

When the food is thoroughly prepared the pylorus relaxes and the food enters into the duodenum. We know that the duodenum has a churning motion which thoroughly mixes the food in turn with bile and pancreatic juices. What we have eaten is then prepared to pass farther on into the intestinal tract.

We can readily understand, then, that when a patient has been the subject of a gastroenterostomy the food is dumped immediately into the last portion of the duodenum without the natural process of preparation. We believe this fact explains why it is that quite a number of patients upon whom a gastroenterostomy has been performed will get immediate help from the operation, but after the lapse of a certain length of time begin to have vomiting, diarrhea and many other symptoms of digestive disturbance.

The intestine at this point is wholly unsuited to meet this unusual and unnatural physiological demand. As has been stated, the fact that so many of these cases are cured, proves the wonderful adaptability of nature.

Stenosis of the pylorus is the crowning indication for a gastroenterostomy.

If it is true that the stomach possesses the segmental activity, then it would appear that an operation of this type must interfere with such activity to a greater or less degree. This is a clear, distinct and great advantage of pyloroplasty over gastroenterostomy.

3. There is an excellent method devised by Balfour which is really duodenoduodenostomy. This method finds its chief application in rather a large duodenum which is freely movable. It is a simpler operation than pyloroplasty and is excellent in cases suitable for its use.

4. We have had occasion to do the Horsley operation three times and with excellent results in each case. We believe

that, as time goes on, pyloroplasty will have a broader field of usefulness and will be more generally adopted.

Quite a few of the bad results following operations for duodenal ulcer and gastric ulcers are due to the fact that sufficient attention is not paid to a strict dietetic regime. Some will think this is a small point, but in my opinion it is most important. A carefully graded and regulated diet is most necessary and will help us turn in a greater number of complete cures.

Balfour calls attention to the great importance of focal infections in the etiology of this disease and points out that a systematic search for various foci of infection must be added to the general surgical plan.

In our humble opinion, that operation will hold first place ultimately which, when it has been completed, obeys most closely the following points:

(*a*) Mechanical rest.

(*b*) Physiological rest.

(*c*) Altered chemistry, which is dependent on the first two points.

(*d*) A stomach whose position and motility are least interfered with.

Finally, let us remember this: We are increasing the number of complete symptomatic cures from 75 per cent to 95 per cent or even more if possible. To carry out successfully the above principles there is room, and lots of it, for the exercise of the very highest degree of surgical judgment and discrimination in the proper selection of method to suit the particular case in hand. It is not primarily a question of the mechanical performance of an operation, but a proper understanding of general principles and the surgical philosophy which rests thereon.

GASTROJEJUNOCOLIC FISTULAS FOLLOWING GASTROENTEROSTOMY

By Charles H. Mayo, M.D.

and

Fred W. Rankin, M.D.
Rochester, Minn.

Gastroenterostomy for the relief of symptoms of duodenal ulcer and in conjunction with other surgical procedures, such as cautery destruction or knife excision of gastric ulcers, gives perhaps as high a percentage of permanent relief as any surgical procedure which changes physiologic conditions to permit nature to effect a cure, but does not directly attack the pathologic lesion. Moynihan has attributed the vast majority of failures following gastroenterostomy to three causes: (1) Absence of an intrinsic lesion in the stomach or duodenum; (2) an incomplete operation which leaves a diseased organ, such as the appendix or gall-bladder, which acts as a focus for recurrent infection, and (3) faulty technic. To this group should be added gastrojejunal ulcers.

The formation of a gastrojejunal or a jejunal ulcer presents a picture so uniform in its symptomatology that a careful history and roentgen study make accurate diagnosis comparatively certain. A search of the literature fails to reveal other adequate causes, although since the syndrome of this sequel to gastroenterostomy has been understood it has attracted much attention. The incidence of gastrojejunal ulcer following gastroenterostomy is within 1 to 3 per cent,

and it seems likely that a better understanding of its nature and perfected roentgenologic technic will increase this percentage at the expense of the group of so-called relapsing ulcers of the duodenum or stomach. Bolton and Trotter, Eusterman and others are authority for the statement that 10 per cent of gastrojejunal ulcers cause gastrocolic fistulas or gastrojejunocolic fistulas, as the case may be.

The first case of gastrocolic fistula reported was in 1903, published by Czerny, and in 1907, Port and Reitzenstein reported a case of gastrojejunocolic anastomosis. Since that time 34 cases have been reported in the literature and reviewed by Bolton and Trotter, who had 4 cases of their own.

In 101 cases of ulcer at or near the gastrojejunostomy anastomosis (reported by Judd) in which operation was performed at the Mayo Clinic, 7 fistulas between the stomach and bowel were found. This percentage of incidence is much the same as that of other observers, who place it at from 1 to 2 per cent. In 55 of these cases the primary operation had been performed in the Clinic, and in 46 it had been performed elsewhere. All of our cases of gastrocolic fistula occurred in males, a fact not surprising when it is remembered that the ratio of males to females with jejunal ulcer is seven to one, while with primary duodenal ulcer it is two and a half to one (Eusterman).

Etiology. In seeking an explanation for postoperative fistula between the stomach and bowel it seems logical to attempt to ascertain the causative factors of both the primary ulcer for which the gastroenterostomy was made and the jejunal ulcer whose extension causes the pathologic anastomosis. Trauma to the operative field is suggested as a possible cause of jejunal ulcer and must be given some consideration, but a number of cases are reported in which clamps were not used on either the stomach or bowel during the anastomosis. The location of one ulcer below the anastomosis on the efferent loop about 10 cm. from the

stoma is also evidence against this. In the Clinic series of 101 cases, 8 ulcers were definitely in the jejunum and 1 was 10 cm. below the gastroenterostomy opening.

The formation of these ulcers is most frequently ascribed to mechanical factors, and yet without much direct evidence to substantiate the contention. The discussion as to the adaptability of the long-loop or the no-loop operation has caused surgeons to recognize that certain basic principles must be carried out to insure the greatest success, and most agree that the anastomosis should be made without a jejunal loop, that the stoma on the gastric side should be at the lowest point on the greater curvature, that the suture material used should be absorbable, and that postoperative alkalinization and adherence to prescribed diet should be insisted on. Inaccuracy in carrying out the technical details of the anastomosis unquestionably leads to trauma which, if prolonged and active, must play some part in the unfortunate postoperative sequelæ. That unabsorbable suture material may have been a possible predisposing factor must be admitted, and yet since the adoption of chromicized catgut as the approximation suture, jejunal ulcers have continued to form. In the 55 cases in our series in which the primary operation had been performed in the Clinic, nonabsorbable material was found in 9; and in the 46 cases in which the primary operation had been performed elsewhere, nonabsorbable material was found in 17. Generally it is embedded in the mucous layer of the stomach or jejunum and presents in the stoma, often several centimeters of silk being free in the opening. Discarding such material has no doubt greatly reduced the frequency of ulcers at the stoma, although its importance as an etiologic factor can easily be overestimated.

Most observers are agreed that infection plays the principal part in the formation of ulcers at or near the gastroenterostomy stoma. The cut tissues are constantly exposed at the time of operation and during the process of healing,

which, as Flint has shown, requires an average of fourteen days. Judd calls attention to the primary ulcer as the possible source of infection from which the abraded mucous membrane of the stoma may receive its bacteria, but he also points out that in 15 of the cases in his series there was no evidence of a primary ulcer. Whether or not there had been a primary ulcer, or whether it had been in the mucosa on the posterior wall, is problematic, but there was no visible scar on the mobile portion of the duodenum inspected. Moynihan has made similar observations in 2 of his cases. The inference is that no particular type of infection is essential, but that some remote source such as the teeth, tonsils, antrums, nasopharynx, gall-bladder and appendix may be the underlying source.

There are no recorded cases of ulcer developing at the suture line of a plastic operation around the pylorus, nor has a resection of the stomach for cancer or ulcer been followed by this sequel. It has been pointed out that the principal cause may be the action of the acid gastric juice on the jejunal mucous membrane, which, unlike the duodenum, is unaccustomed to receiving acid secretions. In the majority of cases of duodenal and gastric ulcers there are hyperacidity and hypersecretion, and these, unneutralized by bile and pancreatic juice, can readily have a deleterious effect on the jejunal mucosa.

Symptomatology. The clinical manifestations of these fistulas usually are preceded for an indefinite time by the symptoms common to jejunal ulcer, a sudden onset of colic and diarrhea, which may or may not be accompanied immediately by vomiting of stercoraceous material and belching of foul-smelling gas. Later, when the opening becomes larger, the latter symptoms are constant, and invariably are followed by severe wasting and great emaciation, although the patient usually continues to have a ravenous appetite. The jejunal ulcer may occur as soon as five weeks after operation or as late as nine and a half years,

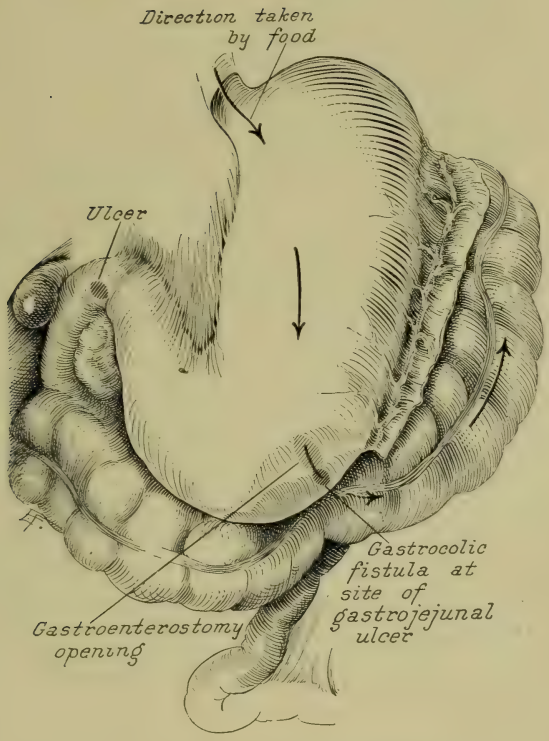


FIG. 1.—Fistula formed by a gastrojejunal ulcer.

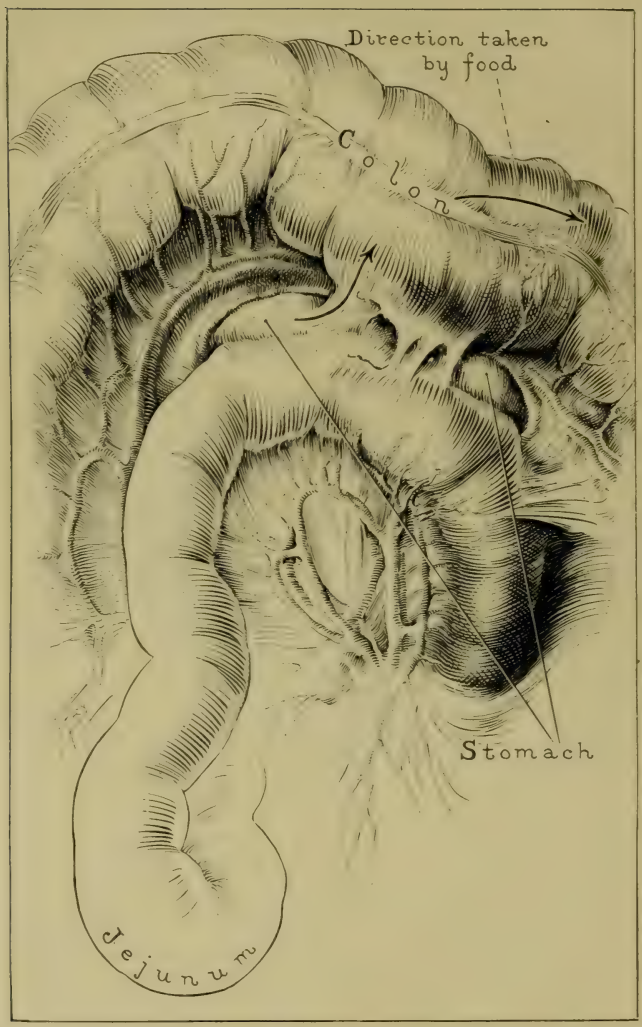


FIG. 2.—The under surface of the mesocolon. The colon attached to the site of the gastroenterostomy.

FIG. 3.—Adhesions around the gastrojejunocolic fistula uniting the colon to the gastroenterostomy.

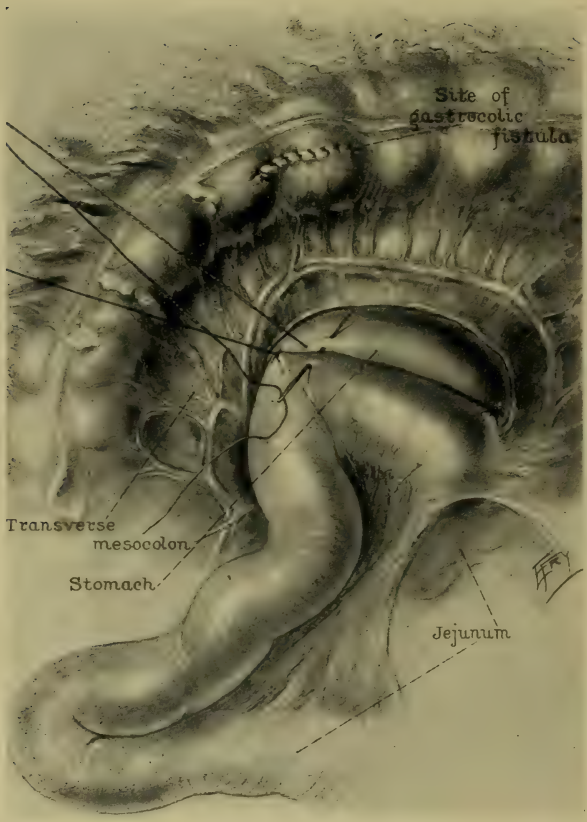


FIG. 4.—The repaired fistula and the beginning of a new gastroenterostomy.

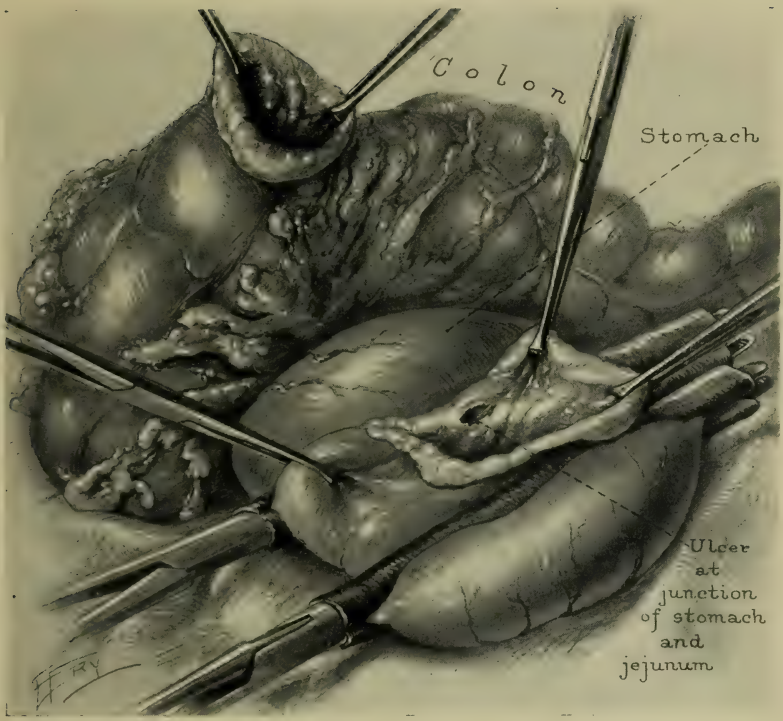


FIG. 5.—The gastroenterostomy opened, exposing an ulcer at the line of the juncture. The colon cut from the gastroenterostomy and held open.

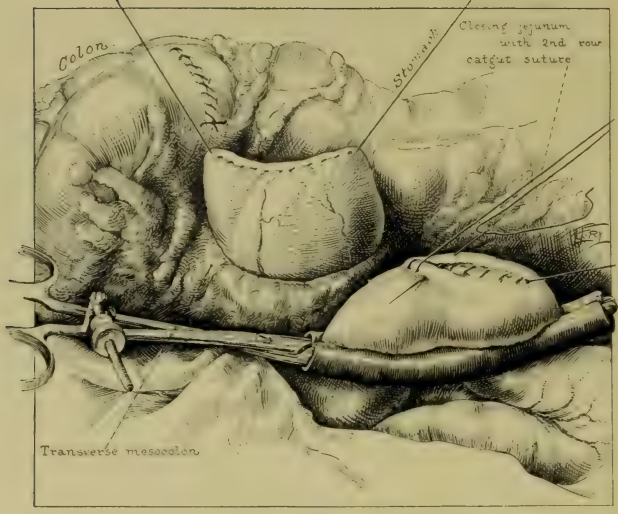


FIG. 6.—Colon, stomach, and jejunum closed.

in spite of rigid ulcer management and continued alkalinization. Usually the symptoms appear within from six months to a year after operation; in the interval between, the patient is comfortable and free from pain and distress. The onset is gradual and insidious and relief is not obtained as formerly by food and alkalies. Usually following such an onset the fistula between the colon and bowel is announced by a sudden attack of pain, diarrhea and fecal vomiting. The diarrhea is produced at once on the entrance of food into the stomach and is lienteric; marked emaciation rapidly ensues. That this picture is not constant, however, is demonstrated in Case VI. The fistula sometimes is incomplete and apparently closes for months at a time, to open and bring about a remission of symptoms.

Pain is not a symptom on which great dependence can be placed, since it is usually intermittent and more often lower in the abdomen than the pain of the original duodenal ulcer. Not infrequently it is confined to the lower left quadrant, a fact for which no very satisfactory explanation seems to have been evolved. A palpable mass is almost always felt near the umbilicus, especially if the condition is of long standing.

The roentgen ray is an invaluable aid in the diagnosis of this condition and is very accurate in calling attention to the fistula. In the 7 cases herewith reported the diagnosis has been confirmed by roentgen ray and demonstrated at operation in each case. In jejunal ulcer the roentgen ray is accurate in more than 75 per cent of the cases.

TREATMENT. Obviously the treatment of this condition is surgical, since a fistula which exists in such an infected tract can scarcely be expected to heal spontaneously. Three distinct problems present themselves for consideration in mapping out a plan to deal with this condition: (1) How may the fistula be eradicated most easily? (2) What measures shall be employed in dealing with the gastrojejunal or jejunal ulcer which caused the perforation? (3) What,

if anything, shall be done to the original ulcer? Since the patient is emaciated and weakened, and formidable procedures, such as resection, which necessarily carry a relatively high mortality even to robust patients, are more liable to result fatally than more simples ones which offer almost as many chances for relief, it seems fairly generally accepted that patients who once develop an ulcer at the stoma tolerate a gastroenterostomy poorly, and that better results are ultimately obtained if the gastroenterostomy is undone and some other means of treating the original ulcer attempted. Trotter disagrees with this statement, and believes that better results are obtained by leaving the gastroenterostomy after having obliterated the fistula. He also suggests cecostomy as a possible safety valve on the fistulous tract after repair. When a fistula is present, a mass is usually felt at the site of the anastomosis, owing to edema and thickening of the tissues at the base of the mesentery of the transverse colon, which contains the original stoma ulcer. The contraction which follows, plus the thickening in the tissues of the mesocolon, tends to pull the transverse colon into the line of anastomosis, where it becomes fastened by the ulcerative process, and only requires a progression of the ulceration and necrosis to produce a communication into the lumen of the adjacent viscera. (Figs. 1, 2, and 3.)

Perhaps the old method of suturing the rent in the mesocolon to the anastomosis may have favored the formation of the fistula, and the present tendency to suture the opening to 2.5 cm. above and on the stomach side may be preventive of this unfortunate result. By carefully dissecting down on the line of anastomosis a cleavage generally can be found which leads to the stomach, and from there the colon can be dissected free and the fistulous tract divided and inverted on both ends. This is much simpler than a massive resection, and is a plan which we have been able to carry out in all our cases with one exception, in which a resection was made and followed by a gastroenterostomy

some months later. In one case an anastomosis was made between the stomach and duodenum after the original ulcer had been destroyed and the jejunal ulcer excised. If it is possible to mobilize the original duodenal ulcer it should be excised with or without pyloroplasty, or Finney, operation or left for a later time if the pylorus is open. (Figs. 4, 5, and 6.)

In the 31 cases of fistula reported by Bolton and Trotter the mortality was not high considering the seriousness of the condition; 27 patients were operated on; 21 recovered; 4 patients were not operated on, and died. In 2 of the patients who died following operation, however, the fistula was not repaired. In our series there has been no operative death. The only patient who is not living died two years after operation from an intercurrent disease.

Case I (A7152).—H. A. S., male, aged sixty years, came for examination August 5, 1912. He had had stomach trouble for twenty years, and about once a month spells of belching, sour stomach, pain around the umbilicus and occasional vomiting. He had used a stomach tube two or three times daily for twelve years. He had been operated on elsewhere six years previously and was told that he did not have ulcer but an atonic, dilated stomach. Following the operation he had been well for eighteen months and had gained sixty pounds. Then the symptoms returned, with pain severe enough to require a hypodermic at times.

Stomach washings at the time of examination showed food remnants and quantities of yellow fluid with marked fecal order. Urinalysis was negative.

At operation, August 12, 1912, a contracted duodenal ulcer and a colic fistula were found at the point of anastomosis between the transverse colon and the jejunum and a fistula was found between the transverse colon and the stomach. A Roux gastroenterostomy was made: 10 cc of the transverse colon were resected with end-to-end suture, and 10 cm. of

jejunum at the site of the fistula with end-to-side anastomosis between the proximal short jejunum and the distal end of the jejunum. The distal end of the jejunum was anastomosed to the posterior wall of the stomach at the site of the original gastroenterostomy.

Convalescence was uneventful. According to the message from his relatives, the patient died April 24, 1914, from acute nephritis.

Case II (A122474).—J. N. A., male, aged thirty-four years, came for examination January 3, 1916. He had had a gastroenterostomy for duodenal ulcer performed in the Clinic in 1915. He was free from symptoms for two or three months following operation, then he suffered from nocturnal vomiting, with bile in the vomitus, pain in the left epigastrium and chest, tenderness, and loss of weight and strength.

A 250 cc specimen of vomitus showed total acids 70, free acid 50, food remnants 1, and blood 1, on a scale of 1, 2, 3, 4; but no bile. The stomach emptied in seven hours. The urinalysis was negative.

February 22, 1916, a gastrojejunal ulcer involving the outer wall of the right upper side of the stomach was excised, the gastroenterostomy cut off, and a partial resection of the jejunum performed, with end-to-end anastomosis.

April 5, 1919, a posterior gastroenterostomy was made for the bleeding type of ulcer, involving practically the entire first portion of the duodenum. The pylorus was occluded. The ulceration was too extensive to warrant resection or local treatment. Considerable obstruction was present. The area of the former closure of the gastroenterostomy and the anastomosis in the jejunum were in good condition.

A slight bronchopneumonia complicated his convalescence; however, the patient was able to leave the hospital on the fifteenth day following operation and was discharged from our care in good condition eighteen days later.

Case III (A118945).—J. J. S., male, aged thirty-seven years, came for examination March 28, 1917. He had had a gastroenterostomy performed in our Clinic November 17, 1914, for duodenal ulcer; he was well for eighteen months afterward and gained twenty-five pounds in weight. In September, 1916, he had a hemorrhage from the stomach, when he vomited about two quarts. He had pain in the abdomen every afternoon, which could be relieved by food.

At the time of examination the patient was thirty pounds underweight. His bowels were constipated. The urinalysis was negative. The hemoglobin was 85 per cent. The stomach contents showed combined acids 54, and free hydrochloric acid 44. A roentgenogram showed the stomach to be adherent to the abdominal wall. A diagnosis of gastrojejunal ulcer was made.

At operation May 2, 1917, an ulcer was found between the jejunum and the transverse colon, with a small fistula into the colon. The old gastroenterostomy was cut off and the fistula closed. A gastroduodenostomy was made.

Convalescence was uneventful. The patient was discharged from the hospital on the tenth day and from our care nine days later.

Case IV (A272499).—H. L. J., male, aged twenty-seven years, came for examination May 27, 1919. He had had an appendectomy in 1908, and gastroenterostomy in 1909, which for two years relieved the low abdominal pain and vomiting from which he had suffered off and on since childhood. The pain returned in 1911, but was controlled by diet. Symptoms began again in 1917, with the sensation of fullness or heaviness at the umbilicus, belching of foul gas and some vomiting after meals. The bowels had been loose for the past six years. He had lost thirty-five pounds in weight in six months.

The patient's chief difficulty at the time of examination was loss of weight and strength, general lassitude, and

occasional vomiting of material with a fecal odor. He was markedly emaciated. Urinalysis was negative. The hemoglobin was 75 per cent, the leukocytes 5600. The total combined acids in the stomach contents were 90, and free acid 76. Roentgen examination showed the gastroenterostomy. A diagnosis of gastrocolic fistula was made.

Exploration June 20, 1919, revealed an ileocolostomy and a portion of the small intestine united by lateral anastomosis to the transverse colon; the small gastroenterostomy had perforated on to the colon through a gastrojejunal ulcer. Many adhesions were found in the upper portion of the abdomen and considerable scarring around the pylorus. The structures were separated and the openings in the ileum and colon closed. The openings in the stomach were converted into one, and a new gastroenterostomy was made. The patient was dismissed from the hospital on the eleventh day, and from our care twenty-three days later in good condition. He has not been heard from since.

Case V (A66081).—J. M., male, aged forty-nine years, came for examination January 1, 1920, with a history of appendectomy and cholecystostomy in 1909, and gastroenterostomy in 1912, following which he had been well for six years. Two years before examination he had had a sudden spell of unconsciousness, followed by vomiting and diarrhea, and watery stools every half-hour for three days. Spells of diarrhea, nausea with dull aching, and pain in the upper right quadrant of the abdomen recurred every three months and increased in severity. They had no relation to food intake. The patient had some dyspepsia between attacks. The later attacks had been characterized by belching of sour gas, with the oder of fecal matter, and some vomiting of fecal material. At times there was blood in the stools.

The urinalysis was negative. The hemoglobin was 78 per cent, the leukocytes numbered 9200. The test meal

revealed total acids 22, free hydrochloric acid 16, and mucus 2, on a scale of 1, 2, 3, 4. The roentgen exam nation revealed a gastrocolic fistula.

At operation December 21, 1920, a perforating gastrojejunal ulcer with a gastrocolic fistula was found, but no evidence of any foreign material. The stomach was dilated and scarred on the anterior surface. There was considerable inflammatory exudate. The old gastroenterostomy was cut off and the gastrojejunal ulcer excised. The fistula was closed.

Convalescence was uneventful. The patient left the hospital on the fourteenth day.

Case VI (A306138).—D. B., male, aged thirty-four years, came for examination February 12, 1920. A gastroenterostomy had been performed elsewhere five years before for pyloric ulcer with obstruction. The patient's first complaint was diarrhea. Since his childhood he had had symptoms of duodenal ulcer, pain in the morning relieved by food, and vomiting at night, or in the morning, of the food which he had eaten the day before. Gastroenterostomy had relieved him until sixteen weeks before examination. He had lost eighteen pounds in weight. Occasionally he vomited fecal matter.

Roentgen-ray examination revealed a communication between the stomach and the transverse colon. Urinalysis was negative with the exception of a slight amount of albumin. The hemoglobin was 78 per cent, the leukocytes numbered 15,800. A test meal showed a total acidity of 40 to 50, and free hydrochloric acid 20 to 30; clay-colored fecal matter was found in the contents.

At operation, February 24, 1920, a gastrocolic fistula and a duodenal ulcer were found. The opening between the gastroenterostomy and the transverse colon admitted two fingers. The stomach was large. The fistulas were closed and a new gastroenterostomy made.

The patient had an uneventful convalescence and was able to leave the hospital the twelfth day and return home eleven days later. He reports that he is well.

Case VII (A373465).—P. J., male, aged thirty-two years, came for examination September 28, 1921, complaining of gastric distress, which began following an injury in an automobile accident in 1912. In 1913, he had been operated on for duodenal ulcer; a posterior gastroenterostomy had been made. He remained well for six years, when he began to have diarrhea; this persisted, and he lost sixty pounds in weight (now weighs one hundred and twenty pounds); he feels tired, weak and dyspneic. His appetite is good and food does not cause distress, although he belches much gas with a foul oder resembling that of feces. For the past month he has vomited at night and again in the morning; occasionally the vomitus is bile.

Examination revealed a right rectus scar with the liver enlarged 2 cm. below the costal margin. The systolic blood-pressure was 110 and diastolic 54. The hemoglobin was 68 per cent, the leukocytes 15,200. The blood examination showed 22 mg. of urea for each 100 cc and 10.2 mg. urea nitrogen. Analysis of the urine, the Wassermann test on the blood, the pupils, the reflexes, and the fundi, and roentgenograms of the chest, were negative. Roentgenograms of the stomach showed a deformed cap and a free gastroenterostomy, and a gastrojejunocolic fistula of the colon. Examination of the stool was negative for tuberculosis, dysentery, parasites, and ova.

At exploration, October 12, 1921, the gastrojejunocolic fistula and many adhesions in the upper part of the abdomen were found. The gastroenterostomy was normal in size and open. The jejunum was greatly distended, and the fistula had formed just above the gastroenterostomy and had perforated into the colon. The colon was dissected free from the jejunum, the openings closed and gastroenter-

ostomy reëstablished. The free border of the omentum was sutured between the repaired gastroenterostomy and the colon, thus protecting both suture lines and guarding against recurrence.

The patient was dismissed from the hospital on the fourteenth day and from observation six days later. He was then improving steadily.

Bibliography

1. Bolton, C., and Trotter, W.: Jejunocolic Fistula following Gastro-jejunostomy, British Med. Jour., 1920, i, 757–762.

2. Czerny, V.: Zur Behandlung der Fissur und des Vorfalls des Mastdarms, Beitr. z. klin. Chir., 1903, xxxvii, 765–769.

3. Eusterman, G. B.: A Clinical Study of Eighty-three Gastro-jejunal Ulcers: Diagnosis Verified at Operation, Minnesota Med., 1920, iii, 517–526.

4. Flint, J. M.: The Healing of Gastro-intestinal Anastomosis, Ann. Surg., 1917, lxv, 202–221.

5. Moynihan, B.: Disappointments after Gastroenterostomy, British Med. Jour., 1919, ii, 33–36.

6. Port and Reizenstein: Ueber Fistula Gastrocolica, Mitteil. a. d. Grenzgeb. d. Med. u. Chir., 1907, xvii, 589–596.

DISCUSSION ON THE PAPERS OF DRS. CRILE, JUDD, GUERRY AND MAYO

Dr. Henry O. Marcy, Boston, Mass.—I congratulate myself and the members of the Association on this interesting morning session. I have attended many meetings, first and last, but never one with greater profit than this morning. The subjects which we have been having under discussion are, of course, of immense interest, but that which I think should be emphasized most of all is the care preceding and subsequent to operations.

After I returned from Mr. Lister's clinic, in 1870, I established a private hospital in Boston and was kept busy for forty years. The object of it was to study the patient as well as the operation. For a long time I operated on a hot table, thinking heat to the

spine was of immense importance. I found that was of advantage to a great many patients. I made a careful and thorough study of my patients previous to operation and of that which Dr. Crile has so wonderfully portrayed to you, the subsequent treatment also. It is the patient we should consider rather than the operation.

Dr. William A. Downes, New York City.—I have some slides I wish to show in reference to gastrocolic fistula in discussing Dr. Mayo's paper.

This (showing slide) is a gastrocolic fistula which followed an operation for jejunal ulcer in which the pylorus was divided. This picture was taken ten minutes after giving the bismuth meal, showing the barium has passed directly from the stomach through the colon. The patient was operated on for a simple gastric ulcer; his pylorus was divided and a gastroenterostomy done in 1913. He had a second operation done in 1914. He had a third operation and his jejunal ulcer was excised in 1916. He came to me in 1917 in this condition. I separated the opening, closed the gastrocolic fistula and reformed the gastrojejunostomy. He came back a year later with a gastrojejunal ulcer and is now in the hospital.

This patient (referring to slide) underwent a gastroenterostomy in 1915. This picture was taken forty minutes after the meal. You can see the barium passing through the stomach and into the colon. Here is a picture taken five minutes after a bismuth enema in which you can see that the barium has passed directly from the colon into the stomach. This patient had a duodenal ulcer in which gastroenterostomy was done. His pylorus was divided. He came to me three years afterward; we separated the jejunum, colon and stomach and reformed the gastroenterostomy because the pylorus had been divided. He has returned with another jejunal ulcer which suggests that the fistula originally followed a jejunal ulcer. Catgut was used in the secondary operations and no clamps. Apparently there is something peculiar to the individuals and not to the actual type of operation done. It is to be noted, however, that the pylorus was divided at the first operation in both cases.

Dr. John M. T. Finney, Baltimore, Md.—The point which has been emphasized in all of these papers is an extremely

important one, and in treating these cases I have always laid stress on the advice and suggestion of my friends, Drs. Julius Friedenwald and T. R. Browne, who have insisted from the first that a surgical operation was but the beginning of the cure. I think they are right, and carrying out their suggestions we have always followed up our cases in the matter of the after-care in diet and have given them a very strict regimen to follow for at least six months after operation, and I cannot help but feel that this has had a great deal to do with the good results we have obtained from operation.

Bleeding from the stomach or duodenum from various causes has been referred to by Dr. Judd. Some years ago I read a paper on rectal hemorrhage in which I reviewed a considerable number of cases which had come under my observation of unaccounted-for bleeding. Appendicitis was considered as a possible source, but we found nothing definite to account for the hemorrhage in some of these cases. It is said that a man is a poor surgeon who cannot find something the matter with the appendix when he is about to take it out. That was the only explanation we could find in a certain number of cases. In others a chronic cholecystitis was present.

This is a most interesting subject and one which, as Dr. Judd says, is as yet quite in the dark so far as finding a satisfactory cause is concerned.

Dr. Guerry's paper interested me very much. There are two or three points which he referred to which have impressed me for some time past, one of which is the question of selection of operation. Here, as elsewhere, we ought to approach every case with an open mind. Every case is a law unto itself, and as our experience and judgment widen and deepen I think we are all beginning to differentiate more and more our cases. Personally, in opening the abdomen for some trouble about the pylorus, it seems to me the question is to determine first what we have. What is the problem? And then decide as to the best way we can meet it.

My experience, based upon the figures which Dr. Guerry has given, convinces me that I get better results by excision of the ulcer, either in the stomach or duodenum, than by the indirect method of gastroenterostomy. Gastroenterostomy is an excellent operation under proper conditions, and these conditions are to my mind a definite ulcer of stomach or duodenum with

an immobile duodenum—that is, a duodenum that is fixed so that it will require a great deal of trauma to mobilize it; and in the second place an obstructed pylorus. If there is present a tightly obstructed pylorus, a good result may be expected in the vast majority of cases from gastroenterostomy. If there is a patent pylorus the question of result from a gastroenterostomy is most uncertain. Therefore with an obstructed pylorus or with a fixed duodenum, gastroenterostomy is the operation of choice. On the other hand with a patent pylorus and mobile duodenum I do not believe it should be performed.

Then comes the question of excision of the ulcer with pyloroplasty. You disturb the physiologic relations very little and you give physiologic rest to the inflamed part. How? By putting out of commission the pylorus the same as you would put out of commission the sphincter ani at the other end of the alimentary canal in cases of fissure of the anus. In the case of the pylorus you put it at rest largely, not absolutely; but you approach as closely as you can phsysiologic rest. Then another thing, it gives one an opportunity to excise the ulcer and restore the parts approximately to normal. That can always be done with ulcer in the anterior wall whether perforated or not. I have repeatedly excised perforating ulcers on the anterior wall through the pyloroplasty incision and closed the same as in an uncomplicated case. It does not complicate the matter at all. It gives one an opportunity to excise ulcers on the posterior wall as well. I am collecting data now for a paper which I expect to prepare in a very short time dealing with a further step in the operation by which we can excise ulcers on the posterior wall of the stomach or duodenum as well as on the anterior wall.

Dr. Robert L. Rhodes, Augusta, Ga.—As regards the efficiency of the pylorus operation I want to mention a case I saw about twenty months ago. The patient was a negro, a farmhand, who had supposedly been cured of pyloric ulcer three times. At operation on the third recurrence the ulcer was found at the lower anterior border of the pylorus and the duodenum was moderately fixed with adhesions. Shortly before that in visiting Dr. Horsley I had seen a sketch of his operation before it was published and proceeded to do one of them. Upon discharge from the hospital two weeks later I gave the negro instructions as regards taking care of himself

for at least a year, but he forgot those instructions and in six weeks' time he was eating fat meat, bacon, vegetables and such like. I have been looking for a recurrence in his case, but two weeks ago he was still free from symptoms.

Dr. J. Shelton Horsley, Richmond, Va.—All the papers read this morning are excellent. The paper of Dr. Guerry expresses the situation so logically that, to my mind, it is admirable. There are just as many bad results if we do a pyloroplasty in all cases of gastric or duodenal ulcer as when we do a gastroenterostomy in every case.

There are three types of cases in which gastroenterostomy is undoubtedly the correct procedure: (1) When there is extensive stenosis to the pylorus or duodenum. (2) When there is an ulcer in the pylorus or duodenum with marked leukocytic infiltration of the tissues around it, for there is likely to follow a stenosis; in such cases stitches do not hold and pyloroplasty cannot be done. (3) When there are very extensive adhesions to the neighboring tissues. If the adhesions are not extensive, and particularly if they are caused by cholecystitis, a removal of the gall-bladder may permit a pyloroplasty because the cause of the adhesions is removed. When the adhesions, however, are very numerous even the removal of the gall-bladder may not be sufficient to prevent them and pyloroplasty is sometimes unsatisfactory here. (4) In inoperable cancer of the pyloric end of the stomach gastroenterostomy is, of course, the only operation to be considered.

The results of gastroenterostomy after pyloric stenosis are excellent because the alkalinity of the duodenal contents has not been impaired by the admission of gastric juice which cannot come through the stenosed pylorus, consequently the duodenal contents with high alkalinity are delivered at the stoma of the gastroenterostomy and quickly neutralize the acid contents of the stomach at the stoma, so preventing jejunal ulcer. When the pylorus is patent, however, the alkalinity of the duodenal contents is reduced by gastric juice and jejunal ulcer follows because of the lack of protection at the stoma of the gastroenterostomy on account of the low alkalinity of the duodenal contents.

We speak of the various causes for jejunal ulcer. Suppose there is a fistula in the upper part of the bowel communicating with the skin of the abdominal wall. It may be that the

abdominal incision was sewed up with catgut or with silk or that the dressing was irritating or that the manipulations were rough. The skin, which may have been perfectly normal before the fistula, quickly becomes irritated because of the *succus entericus* which is poured upon it. The little minor things, such as suturing material in the abdominal wall, the character of dressings, etc., may help to determine an ulcer in the skin in the region of the fistula; but the underlying cause is really because the *succus entericus* is poured out upon the skin which, though formerly healthy, has normally no physiologic resistance against *succus entericus*. So the mucosa of the jejunum, always accustomed to strongly alkaline contents has no normal physiologic resistance against the highly acid gastric juice. While jejunal ulcer occurs in only 3 or 4 per cent of cases of gastroenterostomy it seems highly probable that for every case of jejunal ulcer there are many times greater numbers of cases in which there is sufficient irritation and congestion caused by gastric juice to produce symptoms, but probably not sufficient to form an ulcer.

In this way we can account for the more than 50 per cent of unsatisfactory results that Smithies speaks of as the late effect of gastroenterostomy. This late result often does not occur for one or two years after the operation. Occasionally, too, a patient may have a jejunum with such excellent resistance as to give no symptoms after gastroenterostomy even with an open pylorus.

As a rule, however, the successful results after gastroenterostomy follow the four types of cases mentioned above, whereas pyloroplasty gives the best results in other cases.

Dr. John H. Gibbon, Philadelphia, Pa.—The papers that have been presented this morning represent a very wholesome commentary on present-day surgery because they have dealt with our failures rather than with our successes.

There are two causes for failure in the treatment of ulcer which are apparent from the papers, one of which is failure of the ulcer to heal and the other is the development of jejunal, marginal or peptic ulcer at the site of the gastrojejunostomy. One develops certain impressions after a certain amount of experience; by experience I do not mean the number of operations that one has performed, but I mean the study of our cases before and after operation and particularly with

reference to our mistakes. I think there is a general impression that gastroenterostomy for duodenal ulcer gives the best results when the pylorus is obstructed. Therefore, I still believe that it is a good plan to temporarily obstruct the pylorus. We cannot permanently obstruct it, but a temporary obstruction lasting for two or three weeks does a lot to bring about a cure. With starvation in our earlier cases we had fewer cases of jejunal ulcer. Anything which will help to bring about physiologic rest is especially indicated. This is a strong impression that I have.

In regard to jejunal ulcers I should like to make a point in reference to technic and it is this: In simple ulcers I think very often in doing a gastrojejunostomy (I know we do when we excise the mucous membrane of the jejunum in making a gastroenterostomy) we often leave either a complete circle of raw surface or a circle with areas of raw surface, which I think is a mistake. The redundant mucous membrane of the jejunum should be utilized to cover over the approximated raw edges of the two viscera. (Dr. Gibbon then went to the blackboard and illustrated these points in the technic of the operation by means of diagrams.)

Dr. Charles H. Peck, New York City.—I think Dr. Gibbon has made one of the most important contributions to this subject that we have heard this morning. I have felt for a long time that the importance attached to the hanging silk or linen stitch in the stoma as the cause of jejunal ulcer has been exaggerated. I believe a far more important factor is the one which Dr. Gibbon has drawn attention to, that is leaving a raw surface along the line of the suture or a crack uncovered by mucous membrane in which the acid secretions of the stomach can seep and start a little ulcer which later becomes a typical marginal ulcer. The type of suture has something to do with it, and the Connell or mattress stitch I think often leaves these little cracks or imperfect points of contact into which the secretions of the stomach can seep and interfere with perfect healing. Trimming of the mucous membrane and its retraction may be another cause of leaving these defects. If the mucous membrane of the jejunum and stomach is left untrimmed, if a simple whipover continuous stitch is used with great care so that the mucous membrane comes in contact over the entire raw surface, we have done

a great deal toward the prevention of marginal or duodenal ulcers.

With reference to gastrojejunocolic fistula I have had one case during the past year, the only one that has come under my personal care, one of my original gastroenterostomies performed six years ago, a case which did not do well from the start and had symptoms of jejunal ulcer within a year. I did in this case what Mayo described—separated the three organs, colon, jejunum and stomach, and took down the gastroenterostomy. The original ulcer had healed and the pylorus was patent. I did not do a pyloroplasty.

In regard to Dr. Guerry's paper it was a clean-cut and a sane summing up of the whole subject. It emphasizes the fact that the results of gastroenterostomy for duodenal ulcer give a pretty high percentage of satisfactory cures that last for long periods of time. We have estimated in our own experience that it gives from 75 to 80 per cent of satisfactory permanent cures which we have followed up from three to twelve years or more after operation. That is a good result for any routine operation. I do not agree with Dr. Gibbon as to the value of closure of the pylorus. I do not believe there is anything in it. I think a simple gastroenterostomy will cure the great majority of cases of duodenal ulcer without any further operative procedure.

Dr. Richard A. Barr, Nashville, Tenn.—You may consider it impertinent for me to presume to disagree with such distinguished surgeons as the previous speakers, but I have had the impression that for years we have expected all structures caught by through-and-through gastrointestinal sutures to slough or be digested and disappear. If this is true it is impossible for me to visualize any advantage from drawing the excess of jejunal mucosa over the line of suture in gastrojejunostomy as suggested by Dr. Gibbon. The flap of mucous membrane is gone in a few days and a raw surface is left there just the same.

Dr. Guerry and Dr. Finney both spoke of gastrojejunostomy as the operation of choice in the type of duodenal ulcer in which we cannot mobilize the duodenum. I think they meant it was the operation of necessity. To call it an operation of choice puts one in the position of trying to cure the worst cases of duodenal ulcer by gastrojejunostomy, an operation which

we consider more or less unsatisfactory in the uncomplicated, accessible cases.

I have listened closely to all the speakers for a statement of the indications for simple gastrojejunostomy and have heard only one which is clear cut, and that is obstruction at the pylorus. In all other cases it is made the operation not of choice but of necessity, and apparently because they could not do anything else.

This attitude may do for some, but in my work I find fairly frequently a duodenum which I cannot mobilize and without obstruction. Here neither the Finney operation nor simple gastrojejunostomy is indicated.

It strikes me that the chief advantage of the Finney pyloroplasty is that it enables one to excise the ulcer. As a matter of fact the indication for excision or exclusion of the ulcer is becoming more and more an accepted fact. If one cannot excise or otherwise dispose of the ulcer I do not see how there can be much consistent comfort from the surgery of duodenal ulcer.

I believe that Dr. Gibbon's suggestion of making a temporary obstruction of the pylorus is all right in principle. Unfortunately he has got to make it last long enough to result in cure of the ulcer, and he does not know just how long that takes nor does he know how long he can make his temporary obstruction hold good.

As already stated in my own work I have had a large proportion of ugly ulcers to deal with: Cases without obstruction and with the ulcer inaccessible or covered with adhesions, making cautery or other excision difficult. Cases also with the symptom of bleeding particularly pronounced, for which symptom all admit something definite must be done. For such cases I believe the operation I have done—gastrojejunostomy with permanent pyloric exclusion—is indicated.

Dr. Charles R. Robins, Richmond, Va.—I was much interested in what Dr. Judd had to say about the relationship between infections of the gall-bladder and bleeding from the stomach or duodenum, and I wish to report a case that happened not very long ago:

The patient was a male who gave symptoms that simulated both duodenal ulcer and gallstones, and under these circumstances we made an unusually careful examination previous to

the time of operation and were unable to detect any trouble with the duodenum at all. The patient was operated on and was found to have gall-bladder trouble, and the gall-bladder was removed. Shortly after the removal of the gall-bladder he began to have hemorrhages from the stomach, and these hemorrhages were so severe that he had to have transfusion, and subsequent to the hemorrhages he developed perforation at the duodenum and there was a discharge of duodenal contents from the wound. He subsequently made a good recovery without further operation, notwithstanding the various things that had happened to him, and his health has been permanently restored. At the time of the operation we were unable to find any trouble with the duodenum at all after a careful examination. I do not think that the drainage tube caused an erosion in the duodenum, because he started out having hemorrhages first and had a perforation afterward. It was evidently a duodenal condition with hemorrhage and subsequent perforation.

Dr. Crile (closing the discussion on his part).—The papers presented this morning and the discussion reminded me very much of some of the phases of the appendicitis question many years ago. There came a time when we began to realize that the many little points in technic had very little significance; that on the whole the question was based on the fundamental principles which Dr. Guerry had described. I think by carrying out the principles he has laid down that no matter what the technic may be, as long as it is reasonably good, there will result an enormous improvement of the end-results.

Dr. Judd (closing the discussion on his part).—I want to thank Dr. Finney for supplying the possible source of the etiologic factor in some of these cases of obscure bleeding. I mentioned this factor in the case reports, but I became interested in this particular point because I have had 4 cases close together. I thought there might be some disturbance in the function of the liver similar to the disturbance we found in the jaundiced patients which produced severe bleeding. We have less difficulty in some gall-bladder cases in finding the cause of the obscure hemorrhage.

Dr. Guerry (closing the discussion on his part).—It seems as though we are again driven to the question of pyloroplasty as against gastroenterostomy in some of these ulcer cases, and that in doing a pyloroplasty it puts us on our feet again. I am not contending for any particular technical methods of performance. I think we have definite indications for gastroenterostomy and for pyloroplasty. What I have tried to inculcate is that the process of growth and repair in an ulcer anywhere bears a necessary relationship to mechanical and physiologic rest, not only generally but locally applied to the particular areas we are dealing with.

Dr. Mayo (closing the discussion).—The surgeons of America owe a debt of gratitude to Dr. Crile for constantly pointing out that much of the mortality following surgical operations can be avoided, and is avoided, by the simple means he has shown and which are carried out in his clinic. He has shown that in the same kind of surgical work his associates and assistants get equally as good results by carrying out the measures he has indicated. Others are able to do the same thing by following out his directions. Dr. Crile has acted as a sort of whip on the rest of us; we just have to do what he says.

Dr. Judd has rendered valuable service in calling attention to these abscure hemorrhages, many of which are excessive. Blood may be found in the vomitus and in the stools, so that it is most difficult to find the source. Such hemorrhages are sometimes secondary to other conditions, but the pancreas should be thought of as one of the sources. Neither the interlobular nor the interstitial type is the source of hemorrhage. Both are associated not infrequently with a diseased gall-bladder. Infection takes place through the blood stream or through the duct. By experimentally injecting the pancreatic ducts with certain infective material, hemorrhage in greater or less amounts may occur. The fact is that if it is not free hemorrhage the condition may be the beginning of a pancreatic cyst. In operating at various stages the blood in the cysts resembles coffee-ground material and finally a brown fluid.

In regard to gastroenterostomy: If after operation these patients live properly and are careful about what they eat the majority will be all right, and those that are not all right after operation should be turned over to the internist. It

is possible that if we can get rid of the ulcer by the Balfour cautery or by excision and refer the patients to the internist they may not need gastroenterostomy or pyloroplasty provided there is no obstruction. I have done a great many of the Finney pyloroplasty types of operations. I have done a great many gastroenterostomies. In making a gastrojejunostomy the physiology of the stomach is changed by reducing its acids 40 per cent. If these patients have a low acidity it will be hard to get the pepsin to work. Pepsin will not work except in free acids. If the physiology is to be changed at all a gastroenterostomy should be done to allow the alkalies to drop into the stomach, thus giving the patients the Sippy treatment in a chemical form.

Every case of ulcer of the stomach has been cured medically half a dozen times before it gets to the surgeon. Some of the patients have records of permanent medical cures before we surgeons see them.

THE FACTOR OF OBESITY IN SURGICAL OPERATIONS

By Walter C. G. Kirchner, M.D.
St. Louis, Mo.

(Read by Title.)

The surgical handling of the obese subject presents a distinct problem, which, it seems to me, merits special consideration. The obese patient may become one of surgical interest solely on account of the abnormal deposit or distribution of the fatty tissue itself, on account of the obesity in its association with other diseases of surgical interest or on account of the increased operative risk. The difficulties of diagnosis and also of operative procedure are often very great and it may be well at the start to illustrate certain phases of the subject by giving briefly the report of a case that was referred to me for examination and surgical treatment.

Case I.—Mrs. M. H., aged thirty-four years, presented herself for treatment April 15, 1921.

Present Illness. Patient complained of pain on the right side of the abdomen below the free costal margin. The pain at times was sharp, came on suddenly and varied in intensity and duration, lasting sometimes an entire day. Attacks of pain would sometimes occur in the middle of the night. The first attack was in 1914, when there was pain in the left shoulder, on the right side of the abdomen and in the epigastrium. Her family physician gave her medical

treatment at the hospital, where she remained for thirteen days, feeling much better at the end of this period. For about a year she was without pain or symptoms. In 1915 the trouble recurred and at times the pain was so severe that a sedative was required to give relief. The pain had no special relation to the taking of food and would come on at any time of the day or night. The patient was never jaundiced nor were the sclera ever tinged yellow. Vomiting occurred in the beginning but not during the last five years of her trouble. During the last few years the patient has complained of constipation and she has taken daily some sort of purgative water. There has been no disturbance of the kidney or bladder.

Previous History. Patient was healthy as a child. During an epidemic of influenza she contracted the disease and has also had tonsillitis. Her general health was good except for the present trouble. Her menstruation began in her fifteenth year and has always been regular and without pain. She had two children; both, however, died in infancy. There were no miscarriages. She slept well and the appetite has been good, though of late she has restricted herself to one meal a day. There have been no skin eruptions nor disorders of the nervous system or of the senses. The patient has always been able to be up and about and to work, and has never had any trouble with her feet or legs. Up to her twentieth year she was slender and of normal size, but during the last twelve years has weighed over 300 pounds. Her paternal grandmother was stout, but others in the family were of normal size. Her mental development was normal.

Physical Examination. Patient is corpulent (Figs. 1, 2, 3 and 4). The face, hands, feet, wrists and ankles are normal and all movements are free and easy. The arms, thighs, legs and trunk are covered by excessive deposits of fat. The breasts are pendulous. The abdominal fat hangs as a huge fold and covers the upper portion of the thighs. The

fat on the back hangs on as large folds, resting, as it were, on the upper portion of the hips and buttocks. There is much fat about the regions of the hips and buttocks. The legs and especially the thighs are much enlarged by fat. On the inner and upper portions of the thighs the fat hangs in masses. The arms are also much enlarged by fat, which hangs loosely on the under side. The deposits of fat are firm, mostly smooth and not nodular, and are uniformly and symmetrically arranged. The pendulous portions are freely movable and the abdominal panniculus adiposis has considerable weight.

Measurements. Patient's weight was 317 pounds; height, 5 feet 3 inches. Face, neck, hands and feet were of normal size. Circumference: Forearm, $12\frac{1}{4}$ inches; arm, 17 inches; chest, 46 inches; waist, 57 inches; hips, 66 inches; thigh (upper part), 35 inches; thigh (lower part), $28\frac{1}{2}$ inches; calf, $20\frac{1}{2}$ inches; ankle, 11 inches. At one time the patient weighed 360 pounds, but while under treatment (thyroid extract) lost 65 pounds.

There have been no nervous manifestations. The reflexes were normal. There were no painful areas in the fat or on the skin.

Auscultation and percussion of the heart and lungs revealed nothing abnormal. Abdominal palpation elicited muscular rigidity in the region of the gall-bladder and a moderate amount of pain on firm pressure.

Diagnosis. Lipomatosis universalis (adiposis dolorosa?); cholelithiasis; cholecystitis.

Treatment. On account of the patient's size several surgeons who had examined the case refused to operate. The diagnosis of gallstones seemed plausible, and a waiting policy was likely only to invite more serious trouble. Operation was therefore advised without delay.

Operation. Half an hour before the time of operation morphin sulphate, gr. $\frac{1}{4}$, and atropine sulphate, gr. $\frac{1}{150}$ were given, and just before the operation another dose of

morphin sulphate, gr. $\frac{1}{8}$, was administered hypodermically. The operation was started under local anesthesia, using novocain in solutions varying from 1.0 per cent to 0.5 per cent. The incision just internal to the outer border of the right rectus muscle was seven inches long, owing to the fatty layer which was four inches in thickness. The abdominal cavity was opened and the wound margins were held apart with some difficulty. The omentum was large and thick and the intestines and mesentery were abundantly supplied with fat. The use of local anesthesia was rather more difficult than in thinner subjects. The exposure brought the gall-bladder directly into view. The colon and omentum were adherent to the distended gall-bladder, which was surrounded by a mass of adhesions. The gall-bladder was reddish in color, measured about six inches by one and one-half inches, tense, so that gallstones could not be felt and it could not be emptied by gentle compression. Cholecystectomy was decided upon, but owing to difficulty in exposing the gall-bladder at this stage it was thought best to resort to general ether anesthesia. The gall-bladder was "S" shaped, as a result of the adhesion, and enucleation proceeded from the fundus toward the duct.

Cholecystectomy was performed, the ligated stump being buried and covered with peritoneum. There was no hemorrhage nor escape of bile or other complications, though on account of the fat and the great depth of the wound the operation was made much more difficult and consumed more time than usual. The abdominal wall was closed in layers without abdominal drainage. The fat was approximated by mattress silkworm-gut sutures, "equesetine" was used for the skin and a small rubber drain was placed at the lower angle of the wound. At the close of the operation the pulse rate was 80 and the patient was in good condition.

The gall-bladder was filled with dark, inspissated bile and there were about two ounces of slate-colored gallstones, the size of peas and smaller. The gall-bladder wall was

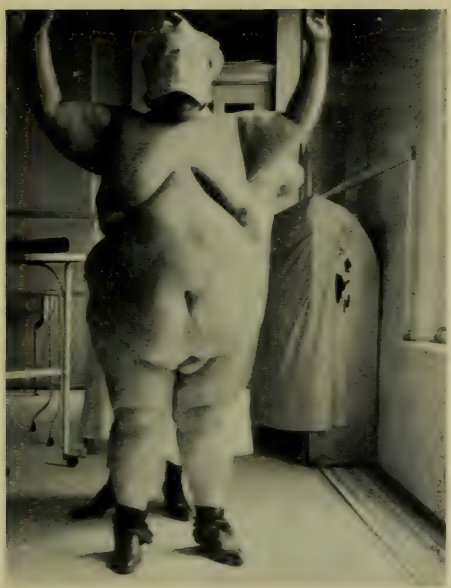


Fig. 1.—Case I. Front view showing dependent masses of fat. Feet and hands are normal.

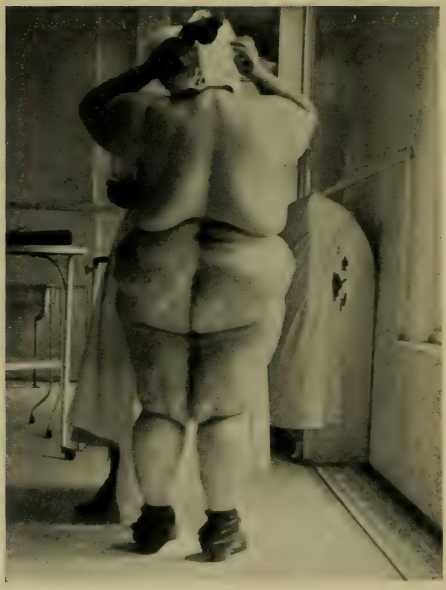


FIG. 2.—Case I. Rear view showing deposits of fat on back, buttocks and thighs.

FIG. 3.—Case I. Side view showing abdominal panniculus adiposis which reaches well down on the thighs.

FIG. 4.—Case I. The abdominal panniculus adiposis is being elevated and demonstrates a distinct indication for lipectomy.

Fig. 5.—Case II. View from the front showing accumulations of fat especially marked about the hips and lower extremities. There is a large ulcer on the left leg.

Fig. 6.—Case II. Side view showing folds caused by dependent masses of fat, and grotesque fat accumulations about the buttocks, thighs and legs.

Fig. 7.—Case II. Patient seated, showing dependent masses of fat under arm, over chest and abdomen, and especially marked at the thigh and leg. The hands and feet are about normal.

thickened and inflamed and the cystic duct was almost occluded.

The mattress stay sutures were loosened on the second day and they were all removed by the fifth day. They were carefully watched to avoid pressure necrosis. Fat globules and oily fluid escaped from the lower angle of the wound and this type of drainage kept up for nearly two weeks. The wound healed without complication, the patient making an uninterrupted recovery. The size of the patient and the management of the masses of fat taxed the skill of the nurses in the postoperative handling of the patient.

Before attempting a serious operation on the obese patient careful inquiry should be made as to the cause of the obesity. In the obese patient the fat is accumulated in abnormal amounts and is found not only in the subcutaneous tissues but also in other tissues and organs. The increased fat production results from deficient oxidation of ingested fats, starches or even of proteins. Heredity is a predisposing factor, more than half of the cases being traced to this cause, and in this type the obesity tends to develop early. Certain nervous affections, the so-called dyscrasias and other allied diseases that lower oxidation, may be causative factors. The excessive taking of certain kinds of food and of water or beverages in many persons, especially when combined with a sedentary life, increases fat production and is the cause of the so-called alimentary obesity. When the fat increase is out of proportion and independent of the taking of food and exercise, then other factors are at work and the condition is spoken of as *constitutional obesity*. In the light of endocrinology alimentary obesity is classed as exogenous, while constitutional obesity is endogenous in character. The commonest type of obesity is lipomatosis universalis. A nodular form of obesity has been described by Anders, of Philadelphia, under the name of adiposis tuberosa simplex. Dercum, also of Philadelphia, has desig-

nated a special form by the term adiposis dolorosa (Figs. 5, 6, 7).

During recent years much thought and experimentation have been devoted to the subject of internal secretion and several types of obesity, endogenous in origin, have been recognized. Obesity may thus be due to thyroid dysfunction, to hypopituitarism, to hyperadrenalism or to involvement of the sex glands. One or more of these functions may be factors in a given case, so that a careful study should be made before medical or surgical treatment is instituted.

The diagnosis of disease in the obese patient is often very difficult. On account of the increase in fatty tissue the physical examination is rendered difficult and the findings are often uncertain. Then, too, the obesity itself may cause certain symptoms. Fatty degeneration or infiltration of the heart may embarrass the heart action and cyanosis, dyspnea, and pulmonary complication—such as passive congestion and edema—may be present. Diabetes and gout are frequently encountered. The liver may be enlarged and digestive disturbance and constipation are frequently complained of. In the female the menstrual function is often disturbed. Certain forms of obesity are characterized by painful areas on the skin and in the subcutaneous tissues.

Abdominal symptoms may be especially difficult to interpret. Fatty deposits in the mesentery and in the intestine may give rise not only to intestinal disturbance but may also be a cause of obstruction. That intraäbdominal deposits of fat may cause a definite group of symptoms has been remarked by Finney,[1] who reported 3 cases, all of them showing well-marked abdominal symptoms, such as right-sided abdominal pain and tenderness and symptoms suggestive of gastric or duodenal ulcer. At the operations deposits of fat were found in the omentum, the mesentery and in the ascending and transverse colon.

[1] Boston Med and Surg. Jour., 1912, clxvii, 495.

In a case of adiposis dolorosa that came under my supervision at the City Hospital, and which I examined, the abdominal symptoms were a marked feature, and inasmuch as obesity of this type is very unusual a special description of this form is warranted. A clinical study of this case was the basis of an excellent paper by Dr. W. W. Graves and Dr. W. H. Cook[1] and the data in the following report of the case are taken from their article. I am indebted to Dr. C. H. Shutt for the photographs of the case.

Case II.—C. R., a negress, aged sixty-two years, was admitted to the City Hospital October 16, 1907, on account of general weakness, painful ulcer on the left leg and shooting pains in the lower extremities. She also complained of pains which were more or less constant in the region of the navel and epigastrium and which radiated to the left side. The trouble began about six years previous to her admission to the hospital, at which time she noticed that her hips and lower extremities were enlarging and, locomotion becoming difficult, she was compelled to use a cane. The patient's mother was the only one among her relatives that was corpulent. The patient had always been well. She had nine full-term pregnancies and one miscarriage. The menopause occurred in the fiftieth year.

Physical Examination. The patient weighed 245 pounds and her height was 5 feet 8 inches. Abnormal yet rather symmetrical accumulations of fat were present on the trunk and on the upper and lower extremities of the body (Figs. 5, 6, 7). The fat accumulations hung loosely from the posterior portions of the arms and from the dorsal aspects of the forearm. The breasts were pendulous, large and flabby and comparatively free from fat accumulations. On the back of the trunk on either side the fat hung in large folds, suspended, as it were, from the scapulæ and

[1] Med. Fortnightly, 1908, xxxiii, 341.

lower costal margins and from the lumbar regions. The abdominal fat was pendulous and descended over the pubes to the upper part of the thighs. The navel was in the center of this fold in a deep transverse fissure. The gluteal regions and the lower extremities, except the feet, were misshapen by large coalescing accumulations of fat, which, however, were more or less symmetrically arranged. On the anterior and lateral surfaces of the thighs the fat masses were somewhat nodular, but on the posterior surfaces the fat hung in huge, pendulous masses which in the sitting position reached to the middle-third of the leg. The patellæ were buried in fat and the anatomical landmarks about the knees were obliterated. The circumference measurements of different parts of the body were as follows: Lower end of forearm, 8½ inches; arm, 19 inches; calf, 24 inches; over mass in popliteal space, 32½ inches; about pelvis and gluteal regions, 54 inches; level of umbilicus, 51 inches; chest, 39½ inches. Pressure over the apices of the lipomatosis masses in the lower extremities caused pain, especially over the nodular masses in the lower-third of the leg. Pressure over the nerve trunks in the lower extremities caused pain, but pressure did not cause pain in the upper extremities. The lower margin of the liver was palpated through the thick abdominal wall. The spleen was not enlarged. The lungs and heart revealed nothing abnormal upon examination. The temperature was normal, the pulse rate 88, and the respirations 24 per minute. Based upon the clinical findings and the symptom-complex the diagnosis of adiposis dolorosa, as described by F. X. Dercum in 1888, was made. The leg ulcer was cured by giving it ordinary care and rest, and, owing to the patient's age, weakness and asthenic condition, no further attempt was made to treat the case surgically.

There are certain diseases and surgical conditions that are prone to occur in the obese. Inguinal and femoral hernias are quite frequently met with, and in fat women umbilical

hernia is especially common. Interstitial hernia is also quite often encountered and occurs mostly in the epigastric region. It is well known that gall-bladder disease and also uterine fibroids are frequently found in fat individuals. Malignant tumors, carcinomas of the breast in particular, have no special respect for the corpulent. Leg ulcers are common and are frequently associated with infections, probably on account of the lowered resistance which fatty tissue offers. Appendicitis and salpingitis also occur. Excessive deposits of fat around the intestine, as well as submucous lipoma, may produce intestinal obstruction. Lipomata in general and interabdominal deposits of fat of the nature of lipoma, to which attention has already been called, may complicate general obesity and require special surgical attention. Then, too, there are various kinds in emergencies, gunshot and stab injuries, fractures, etc., that are encountered in the obese as well as in others.

From the viewpoint of the surgeon, fat as one of the tissues of the body has special applications and is utilized in plastic operations to fill in or to build up anatomical defects, to furnish pads, to render structures more pliable, to prevent adhesions and to serve as a support for relaxed or movable organs. Surgery is also directed toward the accumulation of fat, which occurs either in discrete masses, as in the case of lipomata, or, as in the case of the obese, in the diffuse distribution such as is found in panniculus adiposis, where in the operation of lipectomy large masses or slabs of fat are sometimes removed. Of special importance, however, is the surgery which is directed toward the relief of diseases and surgical conditions in which the obesity itself constitutes a serious complication, and it is this aspect which I wish to emphasize in dealing with the subject.

The general care and treatment of the obese before and after operation demand special attention. In the hospital the usual routine care of the patient is adapted to meet the

ordinary type of case, but this care is often inadequate and deficient when applied to the obese patient, and special measures must, therefore, be instituted. In this connection it may be well to call attention to certain physical factors and data which increase the difficulty of handling the obese patient, namely: Difficulties of transportation; disproportion of the patient's size to the bed or operating table; the necessity, as a rule, for the recumbent position, predisposing thereby to pulmonary complications; difficulties attending catheterization and the giving of enemas; the enervating effect of hot weather and the care of the skin; the management of pendulous and movable masses of fat, the selection of proper binders and supports, and the element of increased operative shock due to a general lowered resistance.

In the preoperative handling special regard should be had for the diagnosis as a guiding factor and as to whether or not the surgical condition is acute or chronic. The region of the body affected—abdomen, head, neck, chest or extremity—often determines the kind of care which should be given the patient.

In the obese patient the surgical risk is greatly increased, and this may also be inferred from the fact that the obese are considered bad insurance risks. Fatty infiltration, if not an actual fatty degeneration of the heart, liver or kidneys, is common in the corpulent. In the presence of infection the danger of fatty degeneration increases, and then, too, this type of degeneration is apt to be a special complication following the use of chloroform anesthesia. Diabetes in association with obesity affords an added risk. The postoperative risk is also increased in that infection and tardy wound-healing is common owing to lack of resistance to bacterial invasion and to the slow recuperative power of fat. It should be emphasized that surgical wounds in fat subjects require special attention and care.

Postoperative wounds of fatty tissue were the subject

of a special investigation made by v. Verebely,[1] who studied hernia and laparotomy wounds, amputations, etc., noting their condition at intervals varying from twenty-four hours to five weeks and based upon his observations the following summary was made:

The studies of v. Verebely help to explain why wounds in fatty tissue heal slowly, especially when the time of healing is compared with that of peritoneum in which a firm fibrous exudate develops within ten hours and in which in less than three days strong union takes place with the formation of new tissue. These studies have shown that macroscopically, after forty-eight hours, there is but little change noticed and the fat surfaces appear pale and dry. There is then a gradual serum infiltration, so that on the third day the fat lobules stand out prominently between the connective tissue septa; a thin fibrinous exudate devoid of bloodvessels and easily removed covers the fat lobules by the end of the fifth day. The exudate becomes thicker, is gradually vascularized, resembling granulation tissue, and by the end of the ninth or tenth day grayish-red strands dip down into the fat and by increase of the connective tissue render the structure abnormally dense. After fourteen days a fibrous change takes place in the deeper layers of the granulation tissue and a gradual retraction of the surface may be noticed.

The microscopic study shows that there are two distinct processes at work: the one relating to changes within the fat cells, the other to changes between these cells; the latter process being characterized by the changes that usually take place in the formation of connective tissue, the fat lobules acting as benign foreign masses. In respect to the former process, among the various changes may be mentioned: (1) A disintegration of fat cells and invasion of lymphocytes and leukocytes; (2) serous atrophy, in

[1] Beitr. z. klin. Chir., 1907, liv, 320, and Prog. Med., December, 1909, p. 213.

which the cells retain their original shape but the space occupied by fat is filled by a clear, watery fluid; (3) simple atrophy, a permanent change in which the size of the cell is decreased; (4) active protoplasmic changes, which lead to the disappearance of fat and the formation of cells resembling the plasma cells in fetal fat, characterized as round, pale cells with large nuclei; and (5) proliferation atrophy, as described by Fleming.

In the preliminary care, when opportunity offers, much can often be done to prepare the patient for the ordeal of operation. Aside from the usual preoperative measures special attention to diet, to exercise or to organotherapy may be the means of materially reducing the weight and fat of the patient. In the case of a patient weighing over 400 pounds and suffering with a leg ulcer who came under our care at the City Hospital, by means of regulation of diet and exercise alone a reduction of nearly 200 pounds in weight was accomplished. When admitted the patient was so fat that he could not reach the back part of his neck nor was he able to tie his shoelaces and to properly dress himself without help. He was allowed but one meal a day, consisting of a small portion of meat, all starchy and sweet foods having been proscribed and active elimination was encouraged by the daily use of a saline laxative. He was also put to hard physical work. In a comparatively short time there was a pronounced reduction in the amount of fat, his general health improved and his usefulness increased to the extent that he was able to look after the regular duties of a ward attendant.

The postoperative treatment should be directed toward the prevention of complications—pneumonia, cardiac failure, wound infection, reopening of wound, hernias, embolism, etc. Since the surgical repair of wounds in the obese is slow the patient should be kept in bed until healing is complete. The after-care presents special problems and the ability and skill of the nurse are often taxed to the utmost.

In operations on the obese attention may be called to certain special observations that apply to this type of case. In addition to the usual operative difficulties there are encountered increased difficulties due solely to the presence of fat. The fat accumulations in the obese are often of such a nature that the normal topography of the body and of regions of the body is altered and the surgical landmarks are lost. This is true in regions about the knee and other joints, the groin, the axilla and the neck, when at operations it is often difficult to discern the normal relations of the various structures. Operations on the bloodvessels and nerves are rendered especially difficult.

The properties of fat vary somewhat according to the location of the fat, and while at the parts exposed to pressure and contact it may be coarse and granular, at the more protected sites and in the abdomen it is soft, friable and easily torn, and the bloodvessels being easily lacerated hemorrhage readily results. The intimate blood-supply of fat is poor and fatty tissue not only heals slowly but also offers poor resistance to bacterial infection.

The obese patient is a poor subject for anesthesia and the proper choice of the anesthetic is important. With ether anesthesia there is often venous stasis, pulmonary congestion, cyanosis and vomiting. Chloroform should not be used in the presence of infection, owing to its tendency to cause fatty degeneration, particularly of the liver. Local anesthesia is less satisfactory in the obese than in the lean patient and the infiltration alone of fatty tissue tends to produce necrosis and may retard wound healing. The preliminary use of morphin or similar narcotic is a great aid when local or ether anesthesia are employed.

The technical difficulties at operation on account of the increase of fat are at times very great. As a rule the incision must be longer and the wound deeper than customary. There is often a capillary hemorrhage which is annoying, and on account of the friability of the fat hemorrhage from

large vessels is sometimes difficult to control. Serious secondary hemorrhage from vessels in the messentery or omentum is not uncommon. Owing to the increased length and depth of the wound a proper selection of instruments should be made to meet all the requirements of the operation. The time of the operation is prolonged and the element of shock is thereby increased. The abdominal organs are surrounded by fat, the intraäbdominal fat is increased and so also is the intraäbdominal pressure. Exploration of the abdominal cavity is rendered difficult, the intestines, stomach or omentum tend to prolapse through the wound and may with difficulty be returned to the abdominal cavity. It is sometimes necessary to remove masses of thickened omentum to permit closure of the abdominal wound.

Surgical wounds in the obese require special handling. The incision through the fat should be clean-cut and long enough to permit of easy inspection and manipulation. Hemostasis should be complete. The ligature material should be as fine as practicable, readily absorbable, non-irritating, and large knots should be avoided. Trauma of fat caused by forceps, by retractors or otherwise should be avoided, not only because healing is thereby retarded but also to lessen the danger of fat embolism. In the closure of the wound it is important to eliminate dead spaces. Buried sutures are not well tolerated in fatty tissue and frequently invite trouble. When the surfaces of the wound cannot be held in approximation by external pressure and the use of adhesive tape, it is better to employ stay-sutures or mattress-sutures of silkworm-gut, being careful in their application to avoid pressure necrosis and infection. Since wounds of fatty tissue heal slowly and tend to discharge fluid, it is well to provide for drainage either through the line of incision or through a supplementary opening. When specially indicated, a small roll of rubber tissue may be used to prevent the drainage open-

ing from closing. The wound should be given sufficient and proper rest to allow adequate healing.

In addition to the complications that occur in the usual type of case the fat patient is subject to complications that are due to the obesity itself. Postoperative pulmonary conditions following the administration of ether, cardiac failure, kidney disturbances, secondary hemorrhage and shock are complications that may occur immediately after the operation. Fat embolism is apt to occur in the obese and follows injuries, manipulations and operations on the bones and joints and when fatty tissue is roughly handled. The fat embolism may affect the pulmonary capillaries, the heart, the brain or the kidneys. Small infarctions of the lungs may cause but slight symptoms, but when the pulmonary circulation affects the heart the resulting dyspnea may be pronounced and even fatal. Fat necrosis may result from cold, as in the prolonged use of the ice-bag, from the use of chemical irritants such as carbolic acid and from injuries to and acute inflammation of the pancreas. The proneness to imperfect wound healing is frequently the cause of postoperative ventral hernia. The increase of intraäbdominal pressure and the over-filling, as it were, of the abdominal cavity with excessive deposits of fat help to explain the frequent occurrence of umbilical, epigastric and other forms of hernia as special surgical complications.

Based upon clinical experience and observation in the surgical treatment of obese patients the following summary is warranted:

The surgical risk in obese patients is greatly increased, due to the frequent occurrence of degenerative changes in the heart, the liver and the kidneys, and also to the mechanical embarrassment of vital functions resulting from the great increase in the deposits of fat. The difficulties attending local as well as general anesthesia are often greatly increased. The technical difficulties at operation are increased, larger surgical wounds are required, abdominal

explorations and procedures are more difficult and require a special surgical armamentarium, the time of the operation is prolonged, and the element of postoperative shock is apt to be more pronounced. Adipose tissue reacts slowly to irritation, the resistance to bacterial infection is poor, surgical wounds heal slowly and have a tendency to discharge a watery fluid mixed with oil and fat globules, and on this account prolonged rest is required to insure complete wound healing. Added to the ordinary complications following operations, is the danger of fat embolism and the greater tendency to the occurence of acquired as well as postoperative hernia. The corpulent individual is subject to the occurrence of the same classes of surgical diseases as are other types of patients, and a plea is made that a greater interest be shown in surgical diseases affecting the obese with the view to proper operative treatment. With careful attention to diagnosis and with proper care and treatment before operation the surgical problem may often be simplified and the dangers attending operation decreased.

THE VALUE OF MENSURATION IN HARELIP OPERATIONS

By James E. Thompson, M.B., B.S. (Lond.), F.R.C.S. (Eng.), F.A.C.S.
Galveston, Texas.

At two previous meetings of this society I have presented communications as to the value of measurements in harelip operations. With the lapse of time, experience has taught me that my position in this matter is no pose, but that measurements are an absolute necessity if uniform accuracy is desired. A surgeon well trained in plastic surgery acquires a high degree of artistic skill comparable in minor degree to that possessed by a sculptor, and by virtue of this quality generally succeeds in making a lip that meets all reasonable demands. Yet be he ever so skilful, if he trusts to his eye alone he will blunder occasionally and the result will show glaring defects; but if careful measurements are taken and certain landmarks pricked out on the skin before the edges of the cleft are pared the chances of mistakes will be reduced to a minimum. Even after careful measurements it is impossible to attain perfection; there is always some undesirable feature left after the most perfect restoration. Personally I have never been satisfied with any lip I have repaired, yet I am convinced that my results have improved steadily and that the improvement is due solely to careful measurements made at the time of operation.

Before attempting to repair a harelip the case should be studied minutely. As an illustration let us take a typical example of a unilateral cleft complete into the nostril.

In Fig. 1, which is a photograph of a baby whose alveolar process has been repaired by molding, all the features embodied in the following description can be studied. In the diagrams (Figs. 2, 3, 4 and 5) the same lip is reproduced, drawn to scale accurately from a projection shadow. The nostril on the affected side flares widely and the ala of the nose lies on the face at a much lower level than the sound nostril. The inner and outer corners of the ala, which for purposes of description I shall call "horns," are marked by the letters *A* and *B* (Fig. 2). The rounded end of the ala is shown by a curved line, with its convexity downward, stretching between *A* and *B*. Below the curved line *A B* a triangular area with its apex at *C* can be seen clearly. The line *A C* is prolonged in a continuous curve until it meets the margin of the cleft at a point marked by a cross ×). The curve is continuous above with the inner margin of the ala. The demilune above it belongs anatomically to the mucous membrane of the outer wall and floor of the nose; the surface below it to the skin of the lip. The triangular area *A B C* is very clearly marked. It is very important anatomically because it represents the triangular prolongation of the lateral nasal process, which in normal development forms the lower margin of the nostril. If the sound nostril be examined carefully a similar triangular area can be seen. It shows white in the photograph. In Fig. 2 this is brought out in relief and shown as the triangle *A′ B′ C′*. The letters on the sound and affected nostrils are placed on similar anatomical points and the triangles are similar in every respect, *i.e.*, *A*, *B*, and *C* coincide with *A′ B′* and *C′* and the sides *A B*, *B C* and *C A*, coincide with the sides *A′ B′*, *B′ C′* and *C′ A′*. It is quite justifiable to assume that the point *C* represents the apex of the area that was laid down in the embryo to complete the margin of the nostril, and that the curved line *A C* was intended to form the lower margin of the nostril and to lie in the position of *A′ C′* if the nostril had been closed. On the margin of the

inner circumference of the flaring nostril a small projection or hump can usually be made out. In a nose with a well-formed columella this is situated usually just below a groove (distinctly shown by an oblique white line in the photograph) which separates the columella from the philtrum. It is shown in the diagram at C'. It designates the place where the apex C of the triangular area of cheek $A\ B\ C$ would have been attached under normal conditions. In some nostrils the point C' is difficult to fix accurately. It is clear that the distance $C\ C'$, measured around the circumference of the flaring nostril, represents the margin of that aperture originally laid down in the embryo. Therefore, unless the affected nostril is wanting in tissue (which is a very rare event), the ring of the nostril will be restored if the point C is brought into contact with C'.

Mere restoration of the nostril ring, however, is only one factor to be considered. There are others of equal importance. In Fig. 2 an arrow is shown on each side which has been drawn at right angles to the line joining the horns of the ala of the nose. On the sound side the arrow points inward and slightly downward. On the flaring nostril it points downward and slightly outward. In order to restore the affected nostril to its normal position the ala must be curled inward and placed in such a position that the arrow will point in the same direction as that on the opposite side. The way in which this is accomplished will be explained later.

The area of lip on either side of the cleft is subject to great variation. Sometimes in narrow clefts the margins are almost parallel. Usually one margin only is very defective. It has appeared to me that the part of the lip developed from the premaxilla (the philtrum) is the more likely to be deficient. Quite frequently the cleft shears obliquely across this portion, leaving only a small part of Cupid's bow visible.

Three essential points must be observed during the repair of the cleft.

1. The lip must be deep enough.
2. The vermilion border must be restored.
3. The nostril must be made exactly like that on the sound side.

The depth of the lip can be estimated in unilateral clefts by measuring from the lower margin of the sound nostril downward to a point on the vermilion border just median to the lateral bend of Cupid's bow. (This line is shown in Fig. 2 on the right of the picture.) In bilateral clefts the depth is fixed somewhat arbitrarily as follows: We approximate the margins of the cleft and reconstruct the nostrils by crowding the soft parts together, as we expect them to lie after denudation and suture. Then a measurement is taken from the lower margin of one nostril to the vermilion border of the lateral portion of the lip on the same side. It is often a matter of considerable nicety to make the lip of suitable depth and to avoid the extremes of a lip absurdly short, on the one hand, or too long (with the resultant monkey face) on the other. Screw compasses are used to prevent error by accidental movement of the points.

Having determined the depth of the lip we are in a position to plan the incisions for denudation of the margins of the cleft. Taking a unilateral complete cleft as an example, the following steps are taken (Fig. 3): The point C' is found on the medial side of the cleft. As pointed out previously, it is usually shown by a slight projection. A deep prick is made here with the sharp point of the compasses. One end of the compasses (previously fixed in measuring the depth of the lip) is placed on C', and the other end on the vermilion border of the lip. A deep prick is made here, which is shown in the diagram as D'. On the opposite side of the cleft the same maneuver is carried out. A prick is made at C (previously fixed, *vid. ant.*), and another at

Fig. 1.—The photograph of a baby, four months old, with a complete unilateral cleft of the lip extending through the alveolar border and both hard and soft palates. The alveolar border has been previously molded and repaired and the anterior part of the palate closed by a previous operation. The left nostril is well formed. The right nostril is wide open and flaring. The full description of the nostrils will be found in the text.

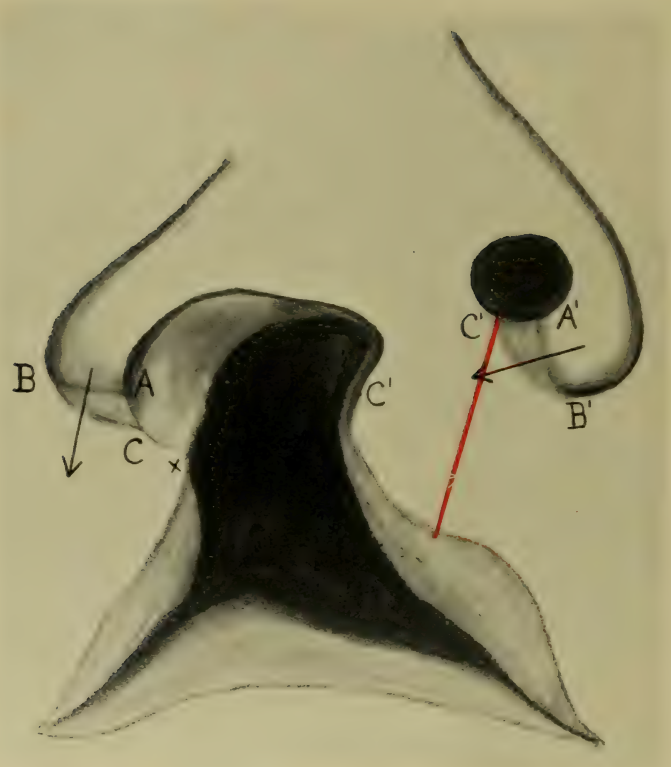


Fig. 2.—An enlarged projection picture drawn from a lantern slide made from the photograph of the case in Fig. 1. The flaring nostril has been drawn so as to bring in relief every detail shown in the photograph. The arrows on either side show the direction in which the ala nasi points. On the side of the cleft the line of demarcation between skin and nasal mucous membrane is shown along the curved line $\times$ *C A C'*. *The red straight line* shows the measurement taken to determine the depth of the future lip. Other detailed description is given in the text.

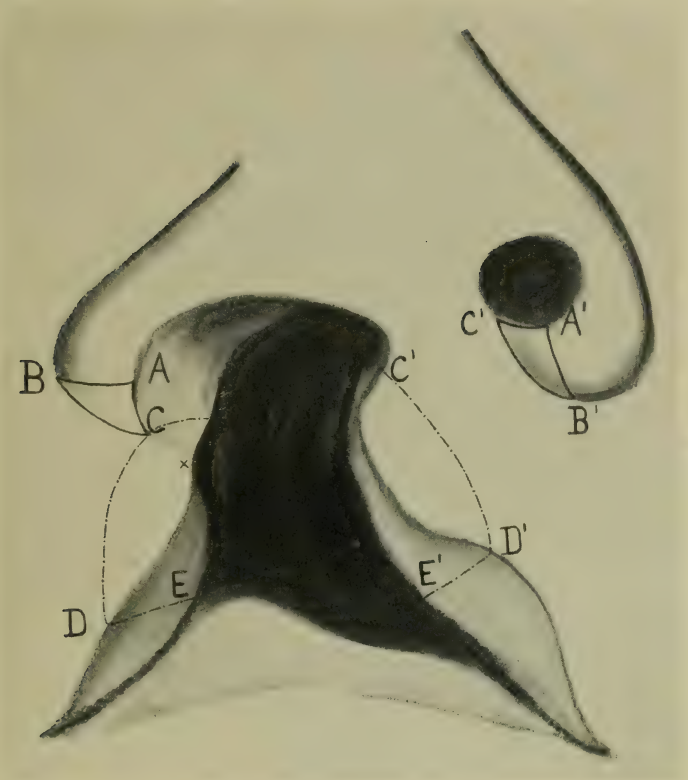


FIG. 3.—The same picture as Fig. 2. The interrupted lines (dash, dot) show the usual method of planning the incisions in order to secure accurate coaptation of the sides. This method will restore the curve of the nostril, make the lip of the proper depth and restore the vermilion border. It will not, however, bring the ala nasi into its correct position. In this picture and in Fig. 5 the upper end of the incision *D C* should not cut its way into the margin of the cleft by passing through the nasal mucous membrane. It should follow the curved line $\times$ *C*. By this means all the nasal mucous membrane is preserved.

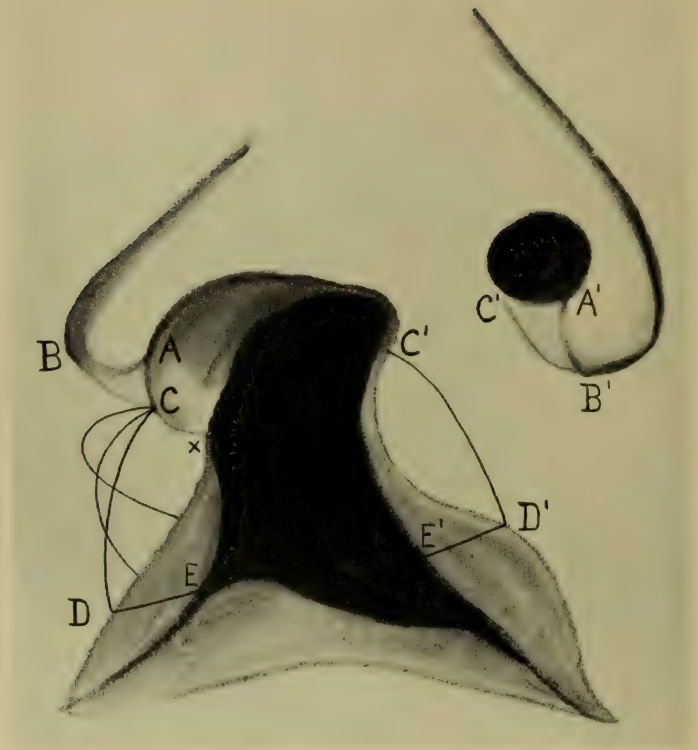


FIG. 4.—On the left of the picture a slightly curved line, *C D*, is shown, which is identical with that in Fig. 3. In addition, two other curved lines are shown stretching from the point *C* to the vermilion border of the lip, along the line *x D*. Each of these lines is of equal length and each is equal to *C D*. The upper line has the most pronounced curve, and its upper end bends somewhat abruptly underneath the outer horn of the ala nasi. Lines through the mucous membrane of the lip, corresponding to *D E*, are purposely omitted to avoid crowding the diagram. The figure shows the necessity of carrying the lateral incision *C D* outward under the point *B*, in order to bring the line *A B* in a position similar to *A′ B′*, when the lines *C D* and *C′ D′* are approximated.

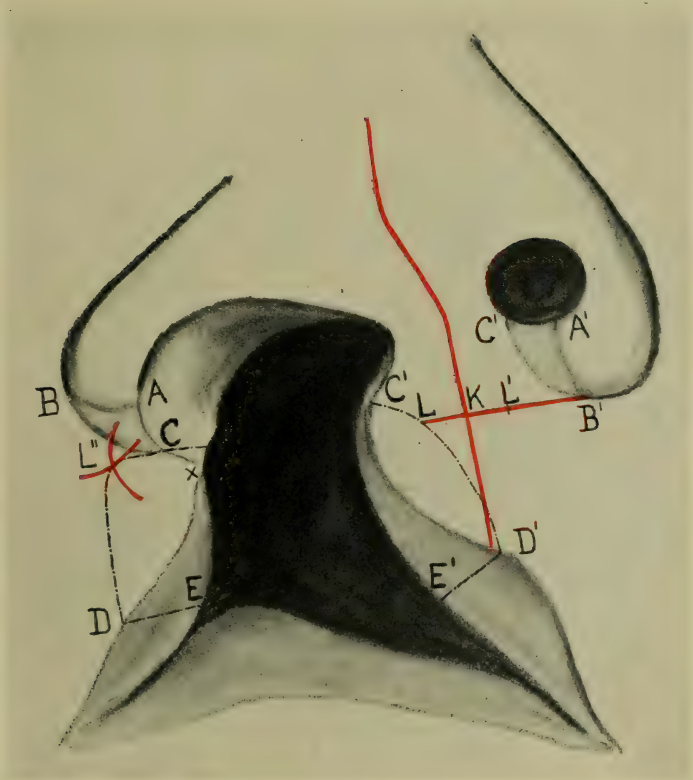


Fig. 5.—Shows the method of fixing the exact curve of the line *C D* in its upper part, and the way to measure a point *L″* along its curve, which has fixed relationships with the points *B* and *C*, of such a nature that when the line *C D* is approximated to the line *C′ D′* the ala *A B* will lie in a position similar to the ala *A′ B′*. The full description is given in the text.

FIG. 6.—A photograph of the harelip shown in Fig. 1, taken one week after repair. The result is not quite satisfactory. The ala of the nose has not been curled far enough upward and inward and the lip is too shallow.

FIG. 7.—A photograph (Baby R) identical in every respect to Fig. 1.

Fig. "*A*"

Fig. "*B*"

Fig. 8.—"*A*" and "*B*" two photographs of same baby (Baby R) taken seven days after repair. The result is very satisfactory. Normal and repaired nostrils have identical curves. The new lip is of the right depth. In this case the degree of undercutting was carefully planned.

D on the vermilion border. By this means we have two distances on each side of the cleft of equal length, each one measured from a point (*C* or *C'*) which will eventually lie on the margin of the reconstructed nostril, to another point (*D* or *D'*) which will eventually lie on the line of the vermilion border of the lip. Taking another pair of compasses, a measurement is taken from the point *D'* on the vermilion border to a point on the free margin of the lip represented by *E'*. A deep prick is made at this point. This measurement must always be a little longer than the shortest distance across the mucous border at this level, and consequently the line *D' E'* usually slants upwards toward the nostril, forming an angle of about sixty degrees with the line *D' C'*. A similar point, *E*, is pricked on the opposite mucous margin. If the points *C*, *D* and *E* and *C'*, *D'* and *E'* are joined by lines with the same curve, the line *C D* will be equal to *C' D'* and *D E* equal to *D' E'*. If the area of lip between the margin of the cleft and these lines is removed on each side, and the point *C* brought in contact with *C'*, *D* with *D'*, and *E* with *E'*, the lines *C D* and *D E* will lie in contact with *C' D'* and *D' E'*. In addition, the ring of the nostril from *C* (through *A*) around to *C'* will be restored, the lip will be of the proper depth as far as the vermilion border, and the depth of the mucous border will be a little deeper than normal.

By the above method we can make a satisfactory lip, but it will fail completely to restore the nostril and to bring the ala nasi into its proper place. The inner horn of the ala (marked *A*) is brought into its proper position, but the outer horn (marked *B*) is not brought far enough upward and inward. The line *A B*, instead of facing in the direction of the arrow shown in *A' B'* (Fig. 2), faces downward and very slightly inward. The flare of the nostril is not fully corrected and the curve of the ala is quite dissimilar to that of the sound side. How can this be remedied? The problem to be solved is to bring the outer horn of the ala,

B, inward and upward, and to curl the nostril so that the line of the ala nasi, *A B*, will face the middle line of the restored upper lip at the same angle as *A′ B′*. Turning our attention to Fig. 4, let us assume that the measurements *C′ D′* and *D′ E′* are satisfactory. The lines *C D* and *D E* are identical with those in Fig. 3. Approximation of the side *C D* and *C′ D′* fails to bring the point *B* far enough inward and upward. Therefore the curve of *C D* is unsatisfactory. In the diagram (Fig. 4) two other curved lines have been drawn (on the left), each beginning at *C* and ending on the vermilion border. Each line is equal in length to *C D*. The curve of each of these lines approaches a little nearer to the point *D*. If it is possible to regulate the curve so that we can fix a point on its convexity which will lie at the proper distance from *B*, and also at the proper distance from *C*, then approximation of this curved line with the line *C′ D′* will bring this point over to the sound side and will carry the point *B* inward and upward, so that the line *A B* will correspond in position to the line *A′ B′*. In plain language, *we must cut under the ala nasi* in order to restore its curve and bring it into its proper position.

The degree of undercutting is explained in Fig. 5. The description is somewhat complicated but essentially logical, mathematical, and feasible. The lettering is an exact replica of the other figures with some additions. The vertical red line (not labelled) represents the middle line of the nose, columella and philtrum. The part lying on the columella is lightly scratched with the point of a scalpel. The points *C′ D′ E′* are pricked out. The lines *C′ D′* and *D′ E′* are scratched. From the point *B′* an imaginary line is drawn across the philtrum to the line *C′ D′*. It must cross the vertical red line at right angles. At the point of crossing a prick is made in the lip (*K*). Another prick is made where it touches the line *C′ D′* (*L*). At *B′* a prick is made. At this stage we have three pricks, *B′*, *K* and *L*, which give us two very important measurements. The

length of B' K is the distance between the outer horn of the sound ala B' and the middle line; whereas the distance L K is that between the edge of the future incision in the philtrum and the middle line. When the lines C D and C' D' are approximated, a certain point on the line C D will come in contact with the point L. This point we will call L''. The distance of B from the middle line will then be the sum of BL'' and LK. Of these L K belongs to the philtrum and its length is known, whereas BL'' is the unknown quantity. But we know that B must be brought as near to K as B' is to K, and that when the parts are approximated the distance B' K (through L') must be equal to the distance B K (through L''), If then we measure along the line K B' a distance K L', equal to K L, and prick off L', the distance B' L' is the unknown quantity. It follows that we must take a point on the line C D, viz., L'', whose distance from B must be equal to the distance of L' from B'. This, however, does not enable us to fix the curve of C D definitely, because L'' might be anywhere under B. The point L'' must be brought into contact with the line C' D' at L. It is necessary, therefore, that the distance between C and L'' along the line C D should be equal to the distance C' L along the line C' D'. We must, therefore, measure along the curve C D a length equal to C' L, which will fix the point L'' in reference to C. In short, the point L'' is fixed accurately as the meeting-point of two measurements, viz., B L'' and C L'', the former being taken from the point B and the latter from the point C. This point is represented in the figure by the intersection of the arcs of two circles whose radii are respectively B L'' and C L''.

On first reading the above description seems formidable and complicated; mathematically considered it is very simple, and in practice the various steps can be carried out with rapidity and precision. Two pairs of sharp-pointed screw compasses will suffice. Measurements made in this manner

are applicable, with slight modifications, to any variety of harelip where one nostril is complete. The normal nostril must always be taken as a model and copied accurately. In complete bilateral clefts, where both nares are wide open, the surgeon must use his own discretion. It is usually wise to make a well-rounded nostril rather than a flat one. Whenever possible it is a good plan to reproduce the family type of nose if there are other children to serve as patterns. In atypical cases it is a very difficult matter to plan the measurements satisfactorily. Cases of complete unilateral cleft on one side associated with partial cleft on the other fall in this class. Owing to the variable amount of soft tissue covering the premaxilla, some of these cases have to be handled like complete bilateral clefts, whereas others are treated as separate unilateral clefts.

I have felt considerable hesitation in presenting this subject in such a dry mathematical garb; but at the present time, when plastic and reparative surgery are developing so rapidly, I feel that any means of securing greater accuracy should be given to the profession.

THE USE OF THE BONE GRAFT IN THE TREATMENT OF POTT'S DISEASE

By William S. Baer, M.D.
Baltimore, Md.

Ten years have now elapsed since Albee first called attention to the use of the bone graft as an aid to the cure of tuberculosis of the spine. It is a sufficient period of time to allow us to draw some conclusions as to the value of the procedure in the treatment of this disease. With this aim in view I have collected the cases of tuberculosis of the spine treated by this method by myself or my partner, Dr. Bennett, and our assistants.[1] The cases reported are 50 in number and the bone graft operation has been done in each one prior to December 31, 1919. Thus two years at least have elapsed since the operation, and in many cases a greater number of years, so that a careful analytical study of each case will throw some light as to the efficacy of the operation and as to when and under what conditions it should be employed.

We have arbitrarily divided our cases into three groups, according to the result obtained:

First. Good results. In this class there are—

a. No symptoms or signs of active tuberculosis in the vertebral column.

b. No support is necessary.

c. There is no kyphosis present or no increase in the preoperative kyphosis.

[1] I am greatly indebted to Dr. Winthrop Phelps for his work in correlating these cases.

Second. Fair results. In this class there are—

a. No symptoms or signs of active tuberculosis.

b. No brace or support at present.

c. Postoperative increase of the kyphos.

Third. Poor results. Cases with process still active, those where support is still necessary or those who have died.

The cases have naturally divided themselves into three groups, according to age at the time of operation.

a. Up to the age of six years, the period of infancy.

b. From six to sixteen years of age, the period of greatest growth.

c. From sixteen years upward, the period where growth for the most part has ceased.

This means that in Class "A," up to six years of age: good, 7 per cent; fair, 21.5 per cent; poor, 71.5 per cent.

Class "B," six years to sixteen years: good, $33\frac{1}{3}$ per cent; poor, $66\frac{2}{3}$ per cent.

Class "C," sixteen years upward: good, 90 per cent; poor, 10 per cent.

From this we may judge that if the operative procedure is instituted before the age of six years the ultimate result is rather poor, while between the age of six to sixteen years the results are somewhat better. If, however, we include in class "A" the cases where all symptoms have ceased, but where the kyphos has increased, as a good result, then the relative comparison is a good result in class "A" of 28.5 per cent against a good result in class "B" of $33\frac{1}{3}$ per cent, or almost the same. That is, the operative procedures in the ages of infancy and of growth have been successful in less than one-third of the cases, even if we are so lenient as to include those cases where the kyphosis has been increased.

On the other hand, in class "C"—those cases operated upon after the age of sixteen—90 per cent have given a good result. This would tend to show that in adult cases

where the growth of the body has ceased and where the human body has concentrated its efforts on repair, then the addition of a bone graft has given excellent results. The *rationale* of this improvement may be that the bone graft acts as an intracorporeal support better to resist traumatism; or that the blood supply between the various vertebral bodies is increased and changed by the new medium placed along the spinous processes.

Localization of the disease:

In the cervical region the poor results were 100 per cent.

In the middorsal and lower dorsal region there were good results in 39 per cent and poor results in 61 per cent.

In the dorsolumbar and lumbar region there were good results in 73 per cent and poor results in 23 per cent.

Those regions of the spine where the vertebral body is the largest, and hence relatively more resistant to necrosis, have given better results. The amount of lessened mobility of the spine, owing to anatomical conditions, as the middorsal and dorsal region, does not seem to have had any favorable influence on the progress of the case toward recovery as would naturally have been supposed.

The effect of the presence of a kyphosis on the ultimate result of the operation: In those cases where there was *no* kyphosis at the time of operation the result of the operation was 100 per cent recovery. In those cases where there was a slight kyphosis at the time of the operation the result of the operation was a cure in 50 per cent of the cases. In those cases where there was a moderate kyphosis there was a cure in 50 per cent of the cases. In those cases where there was a *marked* kyphosis there was a cure in only 25 per cent of the cases, and, consequently, a failure in 75 per cent. In other words, the greater the kyphosis at the time of operation the less the chances of a cure. There are several factors which have probably brought about this law.

Tuberculosis starting after the age of growth is far less likely to produce a kyphosis than when the human body is in the growing stage. Most of the cases which have no or little kyphosis are adults. As we have already mentioned, the results in adult cases are a cure in 90 per cent.

When a kyphosis is large, generally speaking, the bone graft is weakened in order to make it conform to the curve of the kyphosis. Indeed, it has been often observed that under these circumstances the graft has been broken. The graft may break at the time of the operative procedure, or it has been observed to break as long as two years after it has been imbedded. It has further been noted that when a graft broke, the acute symptoms, which had been overcome by the operation, reappeared on the breaking of the graft. It behooves us then in operating to employ as large and stable a graft as can be obtained.

The Number of Spines Fixed at the Time of Operation. This has varied from four to eight spinous processes inclusively. It has always been our aim to take in the spinous processes of the affected vertebræ and, when possible, at least the spinous process of two normal vertebræ above and below the affected ones. In marked kyphoses, composed as they are of many diseased vertebræ, this is not always possible, and when accomplished it is often done at the expense of breaking the graft. If the graft is broken mobility occurs. The fixation is tested in various ways. First, by a lateral picture of the spinal column sometime after the graft has been imbedded; second, by a lead line tracing of the patient in an upright position and in a forward bending posture. The results of our cases show that the fixation has been complete in 75 per cent of our cases.

Duration of the Disease Before Operation. This plays a very definite role as to the successful outcome of the case. In general, the greater the length of time that the disease had existed previous to the operation the more likelihood of recovery. In the cases where the disease had existed

less than six months previous to the operation good results were obtained in 37.5 per cent and poor results in 62.5 per cent of the cases.

When the disease had existed one year: good results, 55 per cent; poor results, 45 per cent.

When the disease had existed two years: good results, 60 per cent; poor results, 40 per cent.

When the disease had existed over two years: good results, 78 per cent; poor results, 22 per cent.

The real cure of any case of tuberculosis of the spine depends on the amalgamation or fusion of the affected vertebræ and of the affected vertebræ to the normal vertebræ above and below. This takes time. There is no short cut in any method by which this may be accomplished. Calve states that in tuberculosis actual ossification that assures repair does not begin until about three years after the onset of the disease. Hence these cases which have been in existence two years are farther on the road to repair than those of a more recent date. The bone graft does not directly bring about consolidation of the vertebral bodies, but only of the spinous processes; but I believe it indirectly helps by the formation of a new blood supply and it alleviates the acute process of the disease by its stabilizing effect.

Duration of Postoperative Fixation. The after-treatment of Pott's cases recommended by Albee was as follows: Place the patient in a position of recumbency without plaster jacket or other support for six, eight or ten weeks. Then allow ambulatory treatment without any support, it being held that the graft would become stronger and that more quickly if the normal physiological activity of the body was allowed. In our experience this has not proven to have been the case. Proper support must be given to all cases after the operation. In adult cases the period of fixation is much less than in those of infancy and during the years of growth. The average period of fixation in the

adult case was six months after the operation. In infancy and during the period of growth the time that fixation was demanded averaged two and one-half to three years. If this support were not applied acute exacerbations of the disease soon appeared. It was also found in this growing period that if proper support were not worn after the operation the kyphosis invariably increased. The graft itself was not capable of preventing further deformity. The graft, being viable, was subject to the same influences and the same laws of strain that made the original kyphos, and, instead of preventing a further kyphos, the graft bent as growth went on and became more rounded and, indeed, even acute in outline. In order to prevent the deformity from occurring a proper brace or support had to be worn over a long period of time, at least through most of the period of growth.

Influences on Abscesses. In general the implantation of a graft has had a beneficial action on the active symptoms of the disease and on the abscess formation. In several cases where an abscess was present before operation, the rapidity of its disappearance was hastened by the implantation and consequent fixation. On the other hand, abscesses often reappeared when the graft became or had improper fixation.

Mortality. While there has been no immediate mortality directly following the operative procedure, the ultimate mortality which might be said to be the result of the operation was 8 per cent. The extent of the operative procedure should make one very careful as to the selection of his cases. Children in infancy and in the growing period affected with tuberculosis of the spine, and in many cases with other sources of tuberculosis, are not good risks for so extensive an operation. I fear that an extensive procedure of this nature is such a grave drain on their constitution that they are made more liable to a spread of the tuberculosis and to secondary infection, as grippe, etc., which

ultimately carry them off. The adult, however, is a far better risk and far better able to withstand the operative procedure.

Conclusions.—In drawing conclusions, therefore, from this series of cases, one can hardly agree with the statement of Dr. Albee that "now Pott's disease must be regarded as a distinctly surgical affection, the operative treatment a *sine qua non*, to be given precedence over all other therapeutic measures. Mechanical treatment must now occupy a minor position, to be employed only as a postoperative adjunct, or with patients who refuse surgical intervention or are not good surgical risks." My own feeling is that *operative procedure* on Pott's disease should be simply used in selected cases as one of the aids in making a cure but not the chief means. Pott's disease, owing to its pathology, must necessarily run a very chronic course, and its cure is only accomplished when amalgamation of the vertebral bodies is assured. This necessarily takes time. Mechanical means, therefore, particularly in infancy and in the growing child, must be the main method for stabilization of the vertebræ, and when the graft is used it is only an aid and must not be relied upon alone. In infancy the operation is questionable, owing to its magnitude and to the tendency which it has to weaken the system and thus bring on general tuberculosis and other infectious diseases. In this class of cases the ultimate, if not the immediate, mortality is high. In the growing period, from six to sixteen years of age, in carefully selected cases the bone graft may be used. Here it must be considered only as an aid, and proper mechanical treatment must be kept up until the period of growth is over or amalgamation of the vertebræ has taken place. In adults the bone graft, in most cases, is generally indicated, but even here mechanical support should be used for at least six months.

SURGICAL TREATMENT OF FACIAL PARALYSIS

By C. C. Coleman, M.D.
Richmond, Va.

Surgery of the cranial nerves is limited almost entirely to destructive operations upon the trigeminal for severe neuralgia and to suture or fusion of a permanently interrupted facial nerve for the relief of a conspicuous deformity caused by paralysis of the muscles of expression of one-half of the face.

Whatever the functional disability which may result from severe injury of the facial nerve, the chief concern of the patient is the serious alteration in his facial appearance and expression.

The deformity, while always considerable, varies in different people, and, as a rule, is more pronounced in the old than in the young. The response of the muscles of the unaffected side to any emotional stimulus gives prominence to the deformity, so that rigid repression of all facial movement is likely to become a fixed habit.

The most common types of facial paralysis result from disease or injury of that segment of the facial trunk which is enclosed in bone. The cases due to infection or compression of the nerve, and known as Bell's palsy, usually recover more or less completely within a few weeks or months, and require surgical treatment only when regeneration of the nerve is unduly delayed or manifestly impossible. Disease or injury of the facial tract above the nucleus of the nerve may produce paralysis of the lower face, but this

form of paralysis is not important as an independent surgical lesion. The nerve may be injured in its course through the parotid gland, and one or more branches may be divided in or distal to this location. Such cases are usually unfavorable for operative procedure upon the nerve itself unless a direct suture is done promptly.

Injury of the nerve during mastoid operations is responsible for most of the cases of permanent paralysis in civil life. This does not appear to be a very frequent accident, but statistics on this phase of the subject are difficult to obtain. It is not of practical importance to speculate on the type of damage which the nerve sometimes receives as a result of operations upon the mastoid. A progressive infection of the nerve may be superimposed upon a direct injury in some of these cases, thus converting a partial lesion with recoverable tendencies into a permanent obstruction to regeneration. Perhaps injury to the facial nerve might often be avoided in radical mastoid operations by the application of a small faradic electrode to tissues of doubtful identification which lie about the usual location of the nerve. Faradic identification of the motor root of the trigeminal is an accepted procedure in operations upon the central root of the Gasserian ganglion, and the local conditions in operations upon the mastoid, or in parotid tumor removal, do not appear less favorable to the employment of this measure as a protection to the facial nerve. The prodding of motor nerves or pinching with forceps, for the purpose of identification, is a crude and unreliable procedure.

The prognosis of severe facial paralysis following either trauma or infection must generally wait upon the intervention of a more or less indefinite period, during which time repeated clinical examinations should be made to determine the progress or absence of regeneration.

The indications for operation in a large majority of cases rest entirely upon a reasonable doubt of the probability of spontaneous recovery. Certain exceptions to delayed

operation are obvious. Stab wounds followed by immediate paralysis should invariably be explored within twenty-four hours and the nerve suitably treated, provided the patient's general condition admits of operation. If promptly explored the distal segments of the nerve may be found by searching the tissues with a faradic electrode.

In some of the cases complicating mastoid operation recovery may set in after two months and progress to entire restoration of function. Severe Bell's palsy may be tardy in showing signs of regeneration, and it seems best to allow a very generous period of time for spontaneous regeneration. It is often impossible in these cases to approximate closely the level of the nerve involvement, and the length of time required for recovery will depend upon the distance the regenerating axis-cylinders must travel to reach the paralyzed muscles. When the nerve is paralyzed by direct trauma during a mastoid operation the approximate level of the injury is known, and if the lesion is a favorable one signs of recovery should appear in two or three months, in accordance with the rate of unobstructed nerve regeneration. The superiority of spontaneous regeneration to the function obtained by fusion operations and the impossibility of performing a direct suture in the large majority of facial nerve injuries, naturally foster a conservative attitude in dealing with cases of facial paralysis.

It is not a simple matter to obtain information by exploration in these cases, as may be done with peripheral nerve injuries, where the nerve may be exposed and appropriate operative measures employed. If, on the other hand, operation is unduly delayed, degenerative changes in the paralyzed muscles may greatly impair the functional end results. In the cases upon which we have operated recovery of muscle function has been less complete in the orbicularis oris than in the other muscle groups. It may be that the delicate fasciculi which comprise this muscle degenerate earlier and more extensively than some of the other muscles

of expression. A similar situation probably exists in the degeneration of the intrinsic hand muscles and imperfect recovery following ulnar nerve division with delayed suture.

We have followed the suggestion of Ballance and waited six months before doing a fusion operation for facial paralysis. This delay seems justifiable in the cases due to infection or compression (Bell's palsy), but we believe that the traumatic cases should be operated upon at the end of the third month if there are no signs of regeneration upon careful clinical examination and electrical tests. The question is sometimes raised as to the advisability of fusion of the facial in cases of paralysis of many years' duration or when recovery has been incomplete and there is deviation of the mouth or inability to close the eye.

If complete degeneration of the muscles has not taken place, most surgeons who are interested in nerve operations would probably favor operation in the belief that a certain amount of benefit might be expected. When one or two of the main branches of the nerve have failed to regenerate because of the lesion of the trunk the propriety of operation might be determined to some extent by the patient's concern about the deformity. Fortunately, regeneration, if it takes place at all, is usually fairly conplete in all of the main branches.

The mechanical treatment of patients with facial paralysis should not be neglected. Light facial massage, galvanic electricity and adhesive splinting of the paralyzed side (Frazier) not only comfort the patient but give actual help.

Operation upon the facial nerve for paralysis, except in rare cases of direct suture of the trunk, substitutes the hypoglossal or spinal accessory for the central segment of the facial, thus restoring the connection between the cortical centers and the paralyzed facial muscles. The value of this type of nerve fusion cannot be questioned if the operation is well conducted in suitable cases.

While no large series of well-tabulated functional end-

results are available for comparison of faciohypoglossal with facioaccessory fusion, we believe the hypoglossal should be preferred because of its functional similarity. The coarseness of spinal accessory movement, its wide anatomical and physiological dissociation from ordinary facial expression and the objectionable shoulder movements which may follow the anastomosis have been frequently emphasized. Objection to the hypoglossal has been made by some because it deforms the tongue, interferes with mastication, swallowing and speech, and that it gives the most persistent and troublesome type of associated movements. The first two objections may be dismissed because the deformity of the tongue is of no moment, and whatever interference with the function of the tongue there may be, immediately after section of one hypoglossal nerve, soon disappears. Some patients seem to attribute the collection of food in the paralyzed cheek to the unilateral paralysis of the tongue. This inconvenience disappears with the resumption of buccinator function, to the loss of which it is mainly due. It is no doubt true that in some cases the associated movements of faciohypoglossal anastomosis are obvious and persistent.

Faciohypoglossal fusion may be very difficult if the extracranial segment of the trunk lies in scar tissue. The depth and protected position of the digastric fossa, the small size of the degenerated nerve and the necessity for effective hemostasis all combine to make the operation slow and tedious.

The skin-platysma incision usually begins above the tip of the mastoid and curves toward the angle of the jaw, following one of the skin creases parallel to the lower border of the mandible. The sternomastoid is retracted backward and the tip of the mastoid process may be removed with its muscular attachment if necessary.

The posterior belly of the digastric is exposed and held down with a small tape. The hypoglossal nerve may usually

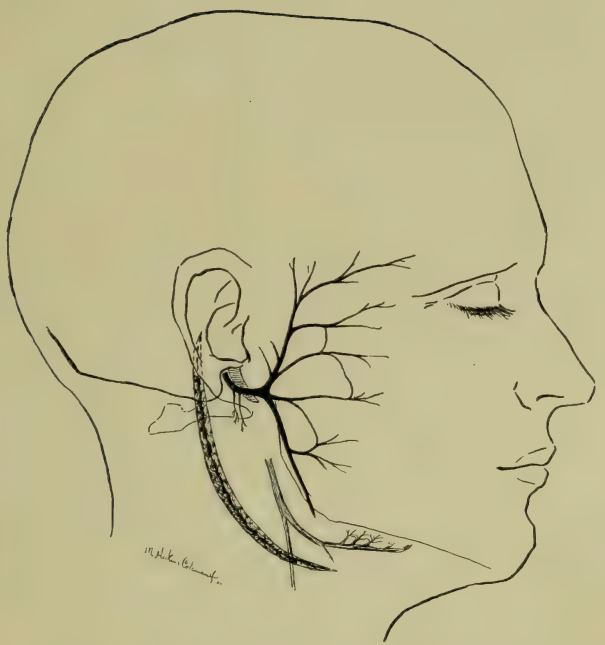


FIG. 1.—Facio-hypoglossal fusion. Curved incision beginning above the tip of mastoid and following skin crease parallel to the lower border of the mandible. Facial nerve shown in heavy black, with two small branches from main trunk to digastric. Note segment of hypoglossal parallel to ascending ramus of jaw.

FIG. 2.—Facio-hypoglossal fusion. Retraction of the sternomastoid backward for better exposure of the digastric fossa, accomplished by chipping off the tip of the mastoid, carrying with it the attachment of the muscles. The small branches from the facial to the digastric are shown, and the facial trunk is seen entering the posterior border of the parotid gland. The facial trunk is divided peripheral to the point where the branches of the digastric break away, for reasons explained in the text. At the lower angle of the incision, the hypoglossal is seen dividing into the ansa and main branch to the tongue.

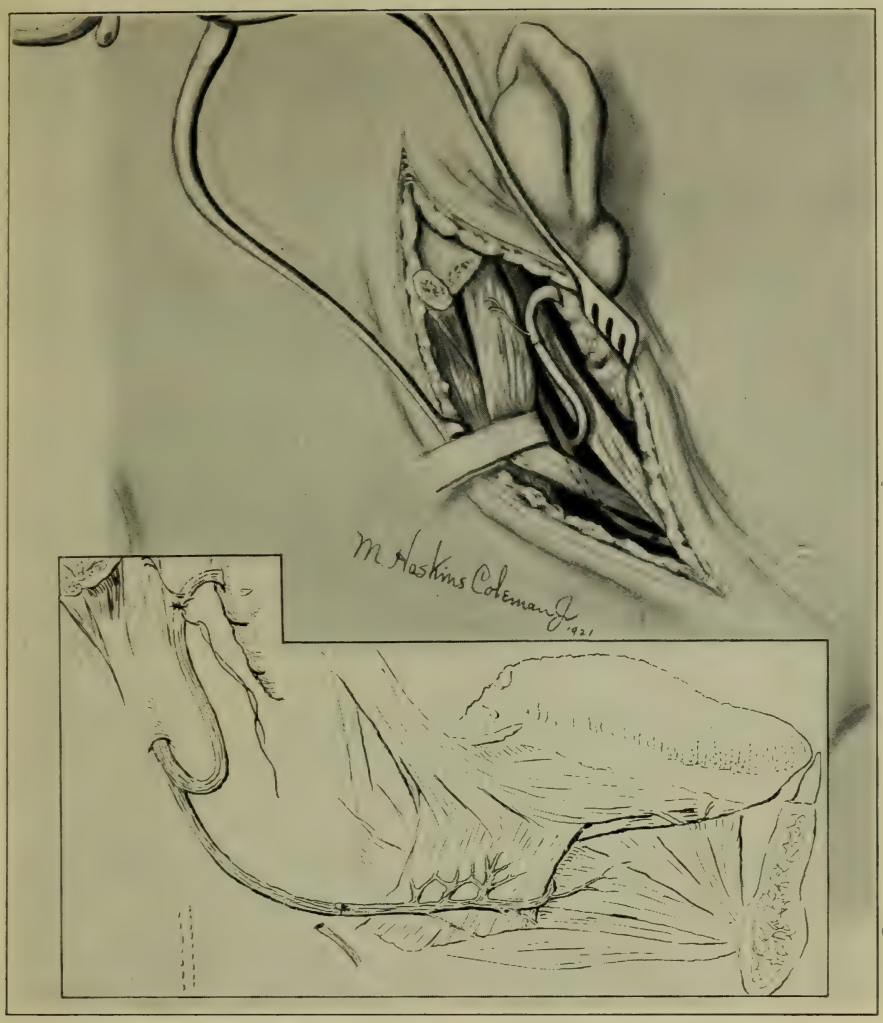


Fig. 3.—Facio-hypoglossal fusion. Digastric is held down by narrow wet tape. The main trunk of the hypoglossal has been sectioned far enough forward to permit approximation with the facial, without tension. When the digastric muscle is released, the site of the anastomosis lies between the digastric and stylohyoid muscles. Insert below shows the type of needle and suture used. The ansahypoglossi has been divided and removed from its course, which is indicated by the parallel dotted lines in the lower left hand cornerof the insert. It is sutured into the main division of the nerve, as indicated.

FIG. 4.—Case No. 1. Complete paralysis of right facial nerve, involving all branches except the depressors of the angle of the mouth, the platysma, stylohyoid and digastric. The paralysis was caused by division of the branches in the parotid gland, by a fragment of glass. Operation five weeks later. Direct suture of divided branches. Trunk of nerve first exposed, and identified by application of faradic electrode, proximal to entrance into the parotid, and traced forward through dense scar tissue, to the site of the injury, which was about one-fourth inch distal to the pes. Four small branches had been completely divided by the fragment of glass. The identification of the peripheral segments of these divided branches required a long, tedious dissection, because of the scar tissue and the minute size of these branches. The branches were sutured with fine silk. The identification of the peripheral segments of two of the branches was doubtful.

A, The absence of levator action of the right side of the mouth is apparent. There is only slight deviation of the mouth due to the preservation of function of the lower branch of the facial, which was not divided.

B, Inability to close the eye of the paralyzed side.

C, Loss of movement in the occipitofrontalis of the right side.

Lower series of photographs, seven and a half months after suture of the branches of the nerve.

AA, Note the restoration of levator action with return of the nasolabial fold of the right side. There is no asymmetry of the face. The palpebral fissures are of equal width.

BB, Movement of right side of face. Note the active movement of the orbicularis palpebrarum. Movement of the occipitofrontalis is beginning (not shown in photograph) and is well advanced in the right corrugator supercilii. The patient is beginning to dissociate movements of the muscle groups.

CC, The patient closes the eye of the right side without mass movement.

The course of recovery after direct suture of the nerve is very similar to that of spontaneous recovery following severe Bell's palsy, in which mass movements may persist for some time.

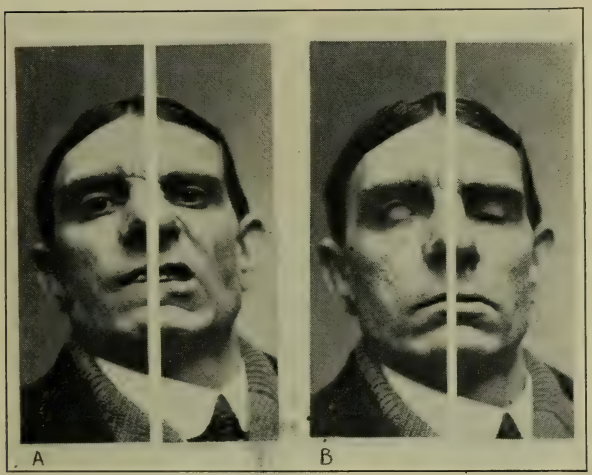


FIG. 5.—Case No. 2. Complete right facial paralysis following lesion of the nerve in the bony canal. Photograph three weeks after onset. Spontaneous improvement began in six weeks after onset, and complete recovery took place within six months. Prognosis of probable spontaneous recovery was based on condenser tests.

FIG. 6.—Case No. 3. Facio-hypoglossal fusion for permanent paralysis of the right facial, following lesion of the nerve in the bony canal.

The upper row of photographs shows various aspects of the deformity before fusion operation.

A, Note the deformity with face in repose.

B, Inability to close eye on the paralyzed side.

C, Emigration of the mouth to the healthy side during effort to make bilateral exposure of the teeth. The immobility of the right side is clearly shown.

E, Support of the paralyzed side by an adhesive strip (Frazier). Note the correction of the deviation of the lower face to the left, and the narrowing of the palpebral fissure of the paralyzed side by the upward pull of the adhesive.

Lower series of photographs, eight months after facio-hypoglossal fusion.

AA, Face in repose. The deformity shown in *A* has disappeared. Note the equal width of the palpebral fissures on the two sides.

BB, The patient closes both eyes without a mass movement. There is still some weakness of the right orbicularis palpebrarum when the eye is closed, without associated movement of the lower face.

D, Appearance of tongue after section of the hypoglossal. Note marked deviation to the right, and atrophy. This causes no interference with speech.

F, Movement of the previously paralyzed side. There is some evidence of mass movement in the effort, but the patient was later able to overcome this satisfactorily.

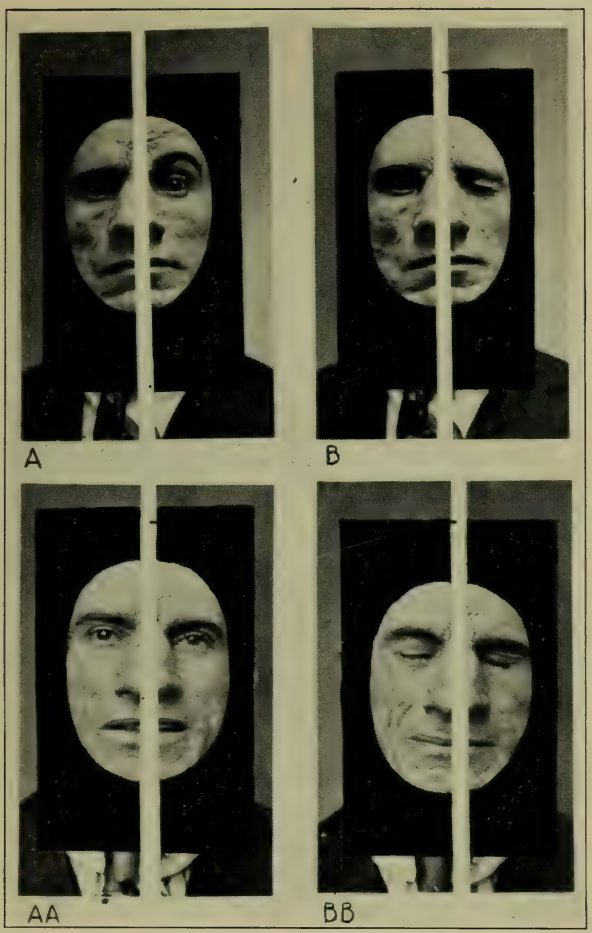


Fig. 7.—Case No. 4. Facio-hypoglossal fusion, for complete paralysis of six months' duration, following the lesion of the nerve in the bony canal.

Effort to elevate the brow and close the eye of the paralyzed right side is shown in *A* and *B*. Although the lower facial muscles were completely paralyzed, the patient had only slight deformity with the face in repose. Condition shown in *AA* and *BB*, nearly two years after facio-hypoglossal fusion. Facial expression is fairly evident in *AA*. There is only slight asymmetry of the mouth in smiling.

BB, Closing the eye of the paralyzed side is accomplished by associated movement of the face.

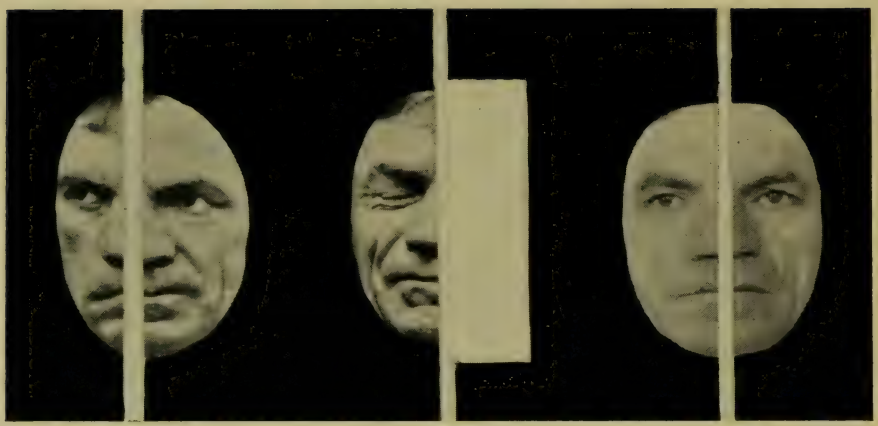


Fig. 8.—Case No. 5. Facio-hypoglossal fusion for complete paralysis right facial nerve of six months' duration, following lesion of the nerve in the bony canal.

A, Face in repose. Note marked deviation of the mouth to left. This case had less sagging of the lower lid than case No. 3, with greater deformity of the lower face.

B, Fifteen months after facio-hypoglossal fusion. Note contraction of the muscles of the previously paralyzed side, and the corrugations about the eye, indicating the action of the orbicularis palpebrarum.

C, Face in repose. Note symmetrical appearance of the two sides of the face. The skin creases in the cheek of the previously paralyzed side are clearly shown. These creases, after recovery from facial paralysis, do not always follow the old lines.

be seen at this stage of the operation, but it should not be disturbed until after the facial is divided. The guide to the facial is the small branch to the digastric muscle. With the digastric pulled down this little branch is followed carefully upward and inward until the facial trunk is reached. We have found no other landmark so reliable in isolation of the facial trunk as the twig to the digastric, and this method of identification has greatly shortened the duration of the operative procedure. The trunk of the facial is stimulated with an electrode, and if unresponsive it is divided just above its digastric branch. No attempt is made to follow the nerve to the foramen. To section the nerve at this high level often requires traction on the nerve, with more or less traumatism and delayed recovery. It seems best to save the nerve supply to the digastric, because this muscle stabilizes the base of the tongue on the paralyzed side.

The stylohyoid branch is liable to be destroyed, whether the facial is divided at or below the foramen. The facial stump is protected with wet cotton and the hypoglossal is then freed sufficiently close to the tongue to permit approximation to the facial without tension. The thyrohyoid branch of the hypoglossal must be sacrificed to allow the central segment of the hypoglossal to be carried up to the facial. A fine silk suture is placed in the hypoglossal trunk distal to the point of section before the nerve is divided. The union of the facial to the hypoglossal is made with arterial sutures and fine curved needles. Three or four epineural sutures are sufficient. The line of anastomosis rests between the digastric and stylohyoid muscles. If the digastric is carefully handled and its sheath is intact adhesions about the line of suture should not be troublesome. The ansa hypoglossi is next divided sufficiently low to allow its central end to be joined to the distal stump of the main trunk of the hypoglossal. One penetrating suture of fine silk is used to unite these nerves.

Drainage should be avoided in all nerve operations, and it is not required provided oozing points have been carefully ligated with fine silk.

The usual equipment for nerve surgery—small forceps, sharp knives, and fine needles and sutures—are required for accurate apposition of these slender nerve trunks.

No form of restraint is used on the head and shoulders after the operation. It is impossible for the patient to make tension on the anastomosis, provided the approximation of the nerve segments was accomplished without tension. The patient usually stays in the hospital about ten days, and leaves with a firm wound and inconspicuous scar.

The first sign of returning function after anastomosis is shown by improvement in the tone of the paralyzed muscles, and this may be detected about seventy-five days after the operation. The asymmetry of the face seems to be less marked and palpation of the muscles indicates that the flabbiness is disappearing.

Voluntary movement has usually first appeared in my cases at the angle of the mouth, and it may be expected in three and a half months after operation, although in one patient the first contraction of the muscles was observed in the orbicularis palpebrarum on the one hundred and thirty-second day. Improvement is rapid from the first appearance of voluntary movement until all of the important muscles, except the orbicularis oris and frontalis, show contraction. Recovery of these muscle groups, in my own experience, has been delayed and unsatisfactory.

The recovery of voluntary movement is first expressed by coördinated mass contractions which involve all of the facial musculature capable of response. Gradually the groups of muscles acquire a dissociation of action and isolated movements become possible—more quickly if the patient persists in intelligent effort at reëducation of the confused neuromuscular mechanism.

The physiological situation created by anastomosis of

two motor cranial nerves has been subjected to much speculation, but little proof of the precise nature of readjustment of cortical function has been submitted to explain the so-called reëducation of muscle groups, which is essential to isolated movements and facial expression.

If the cortical centers for facial movement and expression continue to control the facial muscles, through associational tracts connected with the tongue center, after the anastomosis of the two nerves, then the problem of reëducation in these cases is more easily understood. It is difficult to believe, as some have pointed out, that the hypoglossal center acquires functions primarily residing in the facial area. Recovery of emotional expression is the most difficult achievement of operations for facial paralysis. It appears that this might be superimposed upon the accurate dissociation of the action of the muscle groups, and the latter may be accomplished by patient effort. We have seen one patient, operated upon more than two years ago, who closely imitates facial expression, but the effort lacks the ease and spontaneity of genuine emotional response.

There is very likely to be some permanent deviation of the mouth toward the unaffected side when the patient smiles, but this is not unusual in severe cases of facial paralysis which recover through regeneration of the nerve without operation. Moreover, mass movements of the face are not unknown after recovery from severe attacks of Bell's paralysis.

If simply the return of normal muscle power constituted the sole requirement of faciohypoglossal anastomosis, as is largely true in tests for peripheral nerve recovery, fusion operations for facial paralysis would perhaps be among the most efficient of all operations upon motor nerves. Return of muscle power in the facial muscles, however, is not an equivalent of complete return of function, although the restoration of movement is all that the new nerve-muscle mechanism alone can be expected to accomplish.

Complete function of the muscles of expression arises from the proper readjustment of the cortical areas represented by the fused nerves. However successful the fusion of the two nerves may be in restoring muscle contractility the critical test of the results of the operation must be applied in terms of efficient readjustment of those higher centers whose function is the production of facial expression.

THE PRESENT STATUS OF EPIPLOPEXY, WITH A REPORT OF TEN CASES.

By John H. Gibbon, M.D.

and

John B. Flick, M.D.
Philadelphia, Pa.

The surgical measures employed for the relief of cirrhosis of the liver have been various, but all directed at the diversion to the systemic circulation of a part of the venous blood going to this organ and carrying poisonous products which the liver should normally eliminate. The idea of bringing relief to the liver by this diversion of the venous blood was conceived, like so many new ideas in medicine, independently and at about the same time by several men. The surgical procedure first suggested and practised consisted in irritating by gauze friction the upper surfaces of the liver and spleen and the under surface of the diaphragm and the fixation of the omentum to or in the abdominal wall. Talma, of Utrecht, suggested this operation in 1889, and the first three operations were done by Dutch surgeons, von der Meule (1889), Schelkly (1891), and Lens (1892). The last patient survived the operation six months; the first two died shortly after operation.[1] Rutherford Morison, of New Castle, at the suggestion of Drummond, who knew nothing of Talma's suggestion or of the work of the Dutch surgeons across the channel, performed the first successful operation in 1894 and 1895. These cases were reported in 1896.[2] Talma's first paper appeared in 1898.[3]

Owing to the publications of these three men the operation has been designated by subsequent writers as the "Talma" or the "Talma-Morison," or the "Talma-Morison-Drummond" operation, though they called it omentopexy or epiplopexy, as the fixation of the omentum was considered the important step in the precedure. It is with the present status of this operation that we will deal, but it is well, first, to consider briefly the other surgical means suggested or practised for the relief of hepatic cirrhosis.

The idea of anastomosing the portal vein and the vena cava, the establishment of the so-called "Eck's fistula," would at first sight seem a rational one, provided, of course, the operation carried with it little risk; but notwithstanding the accomplishment of such fistula by Vidal and several other surgeons,[4] the operation has proved too dangerous a one and no patients have survived long enough to enable us to form any opinion as to its effect on the overburdened liver.

The ligation of some of the main tributaries of the portal vein has been done: W. J. Mayo[5] speaks of the ligation of the inferior mesenteric or superior rectal vessels as a supplement to epiplopexy; Moynihan[6] mentions ligation of the inferior mesenteric vein as an additional means of diverting blood from the portal circulation; ligation of the splenic artery with the object of producing atrophy of the spleen has been suggested by J. Gerster, and Hartmann and others have reported cases, but the mortality has been large (Moynihan).

Anastomosis of the superior mesenteric and spermatic or ovarian veins, although accomplished many times, has not been successful.

Transplantation of the testicle and the spermatic cord to the abdomen and surrounding it with the omentum was recommended and practised by Lanz, in 1911, and Lorenz reported 2 cases well two years after the performance of this operation.

All kinds of drainage of the ascitic fluid have been tried. Repeated aspirations have cured some cases, probably due to the resulting adhesions. External drainage, notwithstanding its advocacy by so excellent a surgeon as Rutherford Morison, has not appealed to most surgeons, because of the danger of infection of the peritoneum. Our own plan has been always to take pains to prevent leakage of the fluid after operation. Subcutaneous drainage of the fluid by means of the implantation of silk threads (Lambotte), sections of bloodvessels, glass and rubber tubes, has not been successful after extensive trial. Handley has employed the femoral canal for subcutaneous drainage, but excepting one "brilliant result" the operation has proved unsatisfactory, as the new canal connecting the peritoneum and the connective tissue of the thigh becomes obliterated (Binnie). Routte, in 1907, first tried anastomosing the saphenous vein with the peritoneum, and the operation seemed to offer some chance of successful drainage of the ascitic fluid; but subsequent reports by several surgeons go to show that the drainage is only temporary, as the vein becomes occluded or obliterated.[7]

In 1891, Terrier performed cholecystostomy and maintained the biliary fistula, urging its use for the cure of cirrhosis, on the ground that this condition resulted from infection from the intestinal tract through the bile ducts. This operation was later popularized in France, largely by the publication of many successes by Delagenière. Greenough,[8] in 1902, collected 17 cases, nearly all French, of which 13 were relieved. This operation, however, does not seem to have been given much attention by American or English surgeons. Cholecystenterostomy has also been done in a number of cases. It would seem that both cholecystostomy and cholecystenterostomy could only relieve those cases of cirrhosis due to infection through the bile ducts and gall-bladder. Direct drainage of the liver by puncture through the abdominal wall, done with the idea of relieving

the engorged liver, is not an operation which appeals to surgeons.

A number of successes have apparently followed visceropexy, and a few the simple opening and closing of the abdomen, as is done in the moist type of tuberculous peritonitis. Any successes following these measures must be due to the resulting adhesions and tend to confirm the reasoning of Talma and Morison.

Splenectomy, where an enlarged spleen accompanied hepatic cirrhosis, is recommended very strongly by W. J. Mayo. He has done this operation in 6 cases and 5 were greatly relieved. In splenic anemia he has found cirrhosis of the liver in a considerable number of cases, and here the splenectomy seemed to cure the cirrhosis. Splenic enlargement in cirrhosis of the liver with ascitis does not seem to have been a common condition, but should it be found, splenectomy would seem to be indicated, in view of Mayo's results. Certainly the removal of the spleen cuts down to an enormous degree the blood passing to the portal vein, and both Mayo and Moynihan refer to the poisons carried from the spleen to the liver by the venous channels, and these, of course, are eliminated by splenectomy.

Epiplopexy. Since the early publications of Morison and Talma many contributions to this subject have been made from many countries and various modifications of the original technic have been suggested. Among the early notable papers in this country was one by Packard and Le Conte (*Am. Jour. Med. Sci.*, 1901), including the report of 2 cases; another by Greenough (*Am. Jour. Med. Sci.*, 1902), who presents a summary of 105 cases collected from the literature. The mortality within thirty days in these cases was 29.5 per cent, and there was improvement in 42 per cent. M. L. Harris[9] analyzed the reported cases and several of his own and took a rather pessimistic view of the results obtained. He did not agree with the reasoning of Talma, but believed

that chronic inflammatory changes in the peritoneum were influential in the production of ascites. White[10] and other Englishmen hold the same opinion.

Many valuable papers have been presented during the past twenty years and show very different views as to the benefit to be derived from epiplopexy.

Morison[11] reports 1 case well for seven years after operation and another who lived for six years, dying then following an operation for ventral hernia, and a third died two years after operation from pneumonia. W. J. Mayo[12] reports 28 cases of epiplopexy. There were 4 deaths following the operation and 8 patients died later. The remaining 16 patients he reports as relieved. Moynihan has operated seven times, 1 case being cured, another relieved. The literature contains many reports of 1 or 2 cases which have remained well for a number of years after operation. Large collections of cases have been made by Montprofit[13] in France, by Ladenburger[14] in Germany, and White in England. Eliot and Colp[15] present a study of 23 cases operated upon in the Presbyterian Hospital in New York, out of 127 cases of cirrhosis of the liver admitted to the hospital during the previous seventeen years. In 18 cases the cirrhosis was due to the excessive use of alcohol, 2 were syphilitic and in 2 the ascites was associated with an enlarged liver due to cardiovascular disease. One of these last two died directly after operation, but the other is living and greatly relieved three years after operation. There were 8 postoperative deaths in the 23 cases; the end results were known in but 7 of the remaining 15 cases, and these had all derived benefit from the operation and were living from three months to three years after it. Riesman[16] takes an optimistic view of the condition and urges further use of epiplopexy. He says that "cirrhosis of the liver is one of the few chronic nonbacterial visceral diseases, perhaps the only one, that may actually be cured." He states that if the interval between the tappings for ascites is decreasing, tapping should be discontinued and the patient operated upon.

One is struck in reviewing the literature with the fact that some cases are apparently cured, while others, the greater number, are not benefited at all. It was with the hope of trying to arrive at some explanation of this fact that we took up the study of our own cases, 10 in number, and compared them with those already reported. While our results have not been strikingly good, they have been good enough to make us feel that the operation of epiplopexy is a useful one, and one which we can expect to result in cure in probably 10 per cent of the cases and in benefit to a much larger percentage.

W. J. Mayo puts cirrhoses of the liver into two main groups—one he calls "portal cirrhosis" and the other "biliary cirrhosis": (1) "Portal cirrhosis, in which the irritants—bacterial, toxic, and biochemical substances—are received from the intestinal tract and from the spleen by way of the portal vein, and in which the connective tissue is deposited about the radicles of the portal vein. (2) Biliary cirrhosis, in which the infectious agents reach the biliary ducts by extension of infections from the gall-bladder and great bile ducts, or from hematogenous infections, commonly portal or not rarely systemic, such as those following pneumonia, typhoid, focal lesions, etc., and in which the connective-tissue deposit is related to the biliary ducts. The many varieties of cirrhosis described are to be looked on as variations and combinations of these two main divisions.

"Portal cirrhosis, when advanced, gives rise to clinical symptoms which depend on portal circulatory obstructions shown by ascites and gastric hemorrhages. Jaundice is absent or a terminal condition. Local areas of portal cirrhosis are not infrequent and often without symptoms.

"Biliary cirrhosis, on the contrary, depends on infections in the biliary ducts, and, if the whole or greater part of the liver is involved, jaundice is an early, prominent and continuous feature. Ascites is absent or a terminal mani-

festation. It would appear that we ordinarily recognize as biliary cirrhosis only the late stages of a relatively frequent liver condition after more or less permanent and extensive damage to the liver tissue has taken place. Infections of the gall-bladder and biliary tract are often accompanied by localized cirrhotic processes without definite symptoms."

Whether or not one accepts this classification, it is well to bear in mind the different sources from which cirrhosis may come, and we think it explains to some extent some of the successes and failures of the different operations. For instance, in the "portal" type, biliary drainage, except as the operation produces adhesions, could be expected to do little good, and in the "biliary" type, epiplopexy could hardly produce a cure.

It seems quite evident that the alcoholic cases are the ones giving the best results and the syphilitic the worst. Morison says that we should be able to cure by epiplopexy every case of alcoholic cirrhosis. The majority of our own cases were not alcoholics. He thinks that no syphilitic case is cured by the operation. One of our syphilitic cases, who has survived the operation for five and a half years, has still to be tapped at regular intervals.

Greenough from the study of his collection of cases concluded that the hypertrophic type gave better results than the atrophic, and White and Eliot's collections tend to confirm this fact. In all of our 10 cases the liver was contracted and in but 1 was enlargement of the spleen noted. The results in the cases operated upon early in the disease have been better than where the operation was postponed for a long time. Eliot reports a case, however, of marked cardiovascular disease which was benefited and 1 of our cases presented the same condition. The cases in which ascites is of slow development give better results than those in which it takes place rapidly.

The association of tuberculous peritonitis and cirrhosis

of the liver is an interesting one and probably explains to some extent the difference in opinion as to the source of the ascites. Hertzler[17] states that cirrhosis of the liver occurs in about 12 per cent of the cases of tuberculous peritonitis. In 1 of our cases I found the omentum rolled up and fixed and was unable to do anything but open and close the abdomen. This patient was tapped eighteen times before operation, and of course the condition found may have been due to the previous tappings. He is living, nearly a year after operation, and has been tapped once since. I think it is quite possible that this is a case of tuberculous peritonitis.

Operative Technic. Since there seems to be no doubt that extensive adhesions produce the desired results and that too extensive operative procedures are the cause of a rather high mortality, it would appear that we should make the operation as short and simple as possible. Our own experience has taught us to eliminate elaborate technic and prolonged anesthesia, and therefore in our own recent cases we have simply fixed the omentum to the parietal peritoneum by two rows of mattress sutures passed through the recti about two inches to either side of the midline, the skin being reflected to permit the necessary exposure of the muscles. This requires but a very few minutes. We have used ether, chloride of ethyl, gas-oxygen and infiltration anesthesia, all preceded by morphin, and we believe that the gas-oxygen is probably the best.

Our operative mortality was 2 out of the 10 cases; 1 died of pneumonia forty-eight hours after operation, and the second four days after operation from peritonitis. These deaths occurred when we were following the more elaborate procedure. In the last 6 cases there has been but 1 death, with which the operation might be associated. This patient died two months after operation; she was a syphilitic.

Two modifications of the Morison technic have been extensively employed: Schiassi placed the omentum be-

tween the peritoneum and the abdominal muscles, and Narath brought it out between the recti muscles and fixed it under the skin.

Although these operations apparently have given good results, I think that both add to the operative risk. The same may be said of Morison's method, in which drainage of the pelvis by a glass tube is employed. Of course this would seem also to increase the risk of subsequent infection. We think that most operators have eliminated friction of the liver, spleen and diaphragm because they believe it is productive of shock. In Greenough's collection of cases, the Talma-Morison operation was accompanied by a mortality of 32 per cent and the Schiassi operation by only 17 per cent. It must be remembered, however, that in the Talma-Morison cases, friction of the viscera and drainage of the pelvis were probably employed.

We have had no experience with ligation of the mesenteric veins as an additional means of cutting off the supply of portal blood. It must be remembered that in the majority of cured cases one or more aspirations of the fluid subsequent to operation have been necessary. The reaccumulation of fluid does not mean that the operation is a failure unless it is persistent.

The following is a summary of our 10 cases, all of which have been followed: 1 case died forty-eight hours after operation from lobar pneumonia (Case III); 1 case died four days after operation from peritonitis; operation under infiltration anesthesia followed by wound infection (Case IV); 1 case died two months after operation, apparently from toxemia (Case VII); 1 case died about three months (?) after operation at another hospital; cause of death unknown (Case I); 1 case relieved of all symptoms for three years, then died of apoplexy (Case II); 1 patient relieved of symptoms for eighteen months and able to work, then had several profuse gastric hemorrhages, which were controlled under rest, and the patient discharged from the hospital in good

condition. No ascites. Died four years after operation; cause of death unknown (Case V); 1 case is alive eighteen months after operation and in good health; has gained twenty-five pounds in weight. No evidence of a reaccumulation of fluid (Case VIII); 1 patient is alive six months after operation and able to do light work. No reaccumulation of fluid since discharge from hospital (Case X); 1 case, a syphilitic, is alive five years after operation with no relief of symptoms (Case VI).

Synopsis of Cases

Case I.—Pennsylvania Hospital, No. 1416. Operation, September 6, 1910. S. C., white, female, aged forty-seven years. No alcoholic or syphilitic history; no jaundice; no marked dilatation of superficial veins of abdominal wall; no gastric symptoms; no history of hemorrhage. Edema of lower extremities for four or five months before operation. Urine: specific gravity, 1030; heavy cloud of albumin. No preoperative tappings. Duration of symptoms one year. Operation ten weeks after enlargement of abdomen was first noticed. Morphin-ether anesthesia. The liver at operation was contracted and hard; the veins of the round ligament were greatly distended; there was no enlargement of the spleen; there were no adhesions present. Omentum attached to the abdominal wall to left of incision, peritoneum separated from the vessels on the right and a large mass of omentum inserted into cavity thus produced, and the upper surface of the liver and the under surface of the diaphragm scrubbed with gauze. Abdomen closed without drainage. Reaccumulation of fluid occurred and on the third day a small opening was made through the wound for the purpose of drainage. Six weeks after operation abdomen was tapped and 6000 cc of fluid removed. Patient left the hospital against advice and died a few months after operation at another hospital.

CASE II.—Jefferson Hospital, No. B426. Operation, July 18, 1911. M. Z., white, female, aged sixty years, No alcoholic or syphilitic history, but history of attacks of pain which seemed like gallstone colic and often followed by jaundice years ago. Has not suffererd from these attacks for the past three or four years. Loss of weight; vomiting at irregular intervals; no hemorrhage; no edema of extremities; no dilatation of superficial veins of abdomen. Urine: specific gravity, 1017; faint trace of albumin. Blood: hemoglobin, 70 per cent; red blood corpuscles, 5,100,000; white blood corpuscles, 7600. One preoperative tapping was done a year after enlargement of the abdomen was first noticed. Operation under morphin-chloride of ethyl-ether anesthesia. Liver was contracted and nodular throughout; no enlargement of spleen; there were numerous adhesions about the liver; the colon was adherent so that the gall-bladder could not be felt. The omentum was fixed to the parietal peritoneum on the left side and a considerable portion of the omentum fixed in a pocket made by dissecting up the peritoneum on the right side. Abdomen closed without drainage. There was a postoperative reaccumulation of fluid which disappeared without tapping. Patient discharged from hospital one month after operation and was relieved of symptoms for two years; then died of apoplexy. She never suffered a recurrence of ascites.

CASE III.—Pennsylvania Hospital, No. 1941. Operation, October 22, 1913. A. T., white, male, aged sixty-one years. Moderate drinker of beer; Wassermann negative; duration of symptoms, eight weeks. At the onset of illness abdomen painful, had a chill, some vomiting and was slightly jaundiced. No dilatation of superficial veins of abdominal wall; no edema of lower extremities; no hemorrhage. Urine: specific gravity, 1030; trace of albumin; few leukocytes and hyaline casts. Leukocyte count, 6900. First tapping about three weeks after onset of symptoms; 5715 cc of fluid removed.

There were four preoperative tappings and between 5000 and 6000 cc of fluid removed each time. Operation under morphin-chloride of ethyl-ether anesthesia. Liver was contracted to about one-fourth its normal size and the veins of the omentum were enlarged; no enlargement of the spleen; no adhesions. The omentum was split and the two halves crossed and each inserted into a pocket on either side of the wound made by dissecting up the peritoneum. Abdomen closed without drainage. Death forty-eight hours after operation from lobar pneumonia.

Case IV.—Pennsylvania Hospital, No. 2699. Operation, November 12, 1913. D. Di. G., white, male, aged forty years. Alcoholic beverages to excess; chancre at seventeen years (Wassermann not recorded). History of attack of pain in right hypochondriac region, necessitating morphin, two years previous. Second attack, similar in character but on left side, six months later. No jaundice. During present illness slight loss of weight; discomfort in epigastrium; edema of legs; hemorrhoids; no dilatation of the superficial veins of the abdomen. Urine, specific gravity, 1016; faint trace of albumin; few granular casts. No preoperative tappings. Operation four weeks after enlargement of abdomen was first noticed, under infiltration anesthesia. Liver contracted and hard; no enlargement of the spleen; no adhesions. The omentum was divided, the two halves crossed and each inserted into a subperitoneal pocket. Death four days after operation from peritonitis.

Case V.—Jefferson Hospital, D4726. Operation, February 28, 1914. A. M., white, male, aged fifty-two years. Heavy drinker of beer; no history of syphilis. Duration of symptoms about one year. Epigastric pain, worse during day, not influenced by the taking of food; bowels irregular; has had several profuse gastric hemorrhages; is pale and has lost between twenty and thirty

pounds in weight in the past year. Sclera icteroid; no dilatation of superficial veins of the abdomen; no edema of the extremities; no free fluid demonstrable before operation. Urine, negative; feces, negative for occult blood. Blood: hemoglobin, 72 per cent; red blood corpuscles 4,120,000; white blood corpuscles, 8800. It was a question whether this patient had a cirrhosis of the liver or a malignant growth. Operation under morphin-chloride of ethyl-ether anesthesia. Liver was found contracted and irregular, with considerable free fluid; no enlargement of spleen; no adhesions. Omentum attached to abdominal wall by three mattress sutures on each side of the incision and the wound closed. Postoperative course uneventful. Discharged from hospital five weeks after operation. Patient well of symptoms and working for eighteen months, then several profuse gastric hemorrhages, controlled by rest, and the patient discharged from the hospital in good condition. No ascites. Died four years after operation; cause of death unknown.

Case VI.—Bryn Mawr Hospital. Operation, June 9, 1916. H. M., white, female, aged sixty years. History of intemperate life; Wassermann strongly positive. It was a question whether this patient had a cirrhosis of the liver or a malignant growth of the colon. There was considerable fluid in the abdomen, but the roentgen ray suggested some obstruction at the hepatic flexure. Operation under morphin-gas-oxygen anesthesia. There was marked cirrhosis of the liver and an enormous quantity of fluid in the abdomen; no enlargement of the spleen; no adhesions. The omentum was sutured in a pocket between the peritoneum and muscle. Postoperative course uneventful, but there was a reaccumulation of fluid. Five years later patient is alive and able to do light work, but has never been free from ascites. She has had to be tapped at intervals of a few weeks ever since her discharge from the hospital. She now has marked dilatation of the superficial veins of the abdominal wall.

Case VII.—Pennsylvania Hospital, No. 4280. Operation, January 17, 1917. M. I., white, female, aged fifty-three years. No history of alcohol; Wassermann strongly positive. Cough, night-sweats and loss of weight for the past year; abdomen noticeably swollen for the past four months. Past few months dyspnea; nausea at times, but no vomiting; no jaundice; no hemorrhages; no edema of lower extremities; no dilatation of superficial veins of the abdomen. Urine: specific gravity, 1020; light cloud of albumin; few hyaline and granular casts. No preoperative tappings. Operation four months after swelling of abdomen was first noticed under morphin-chloride of ethyl-ether anesthesia. Liver rough and contracted; no enlargement of spleen; no adhesions, except about uterus, which contained fibroids. Omentum sutured to incision and abdomen closed. A week after operation there was some bleeding from the wound, controlled by packing. There was a reaccumulation of fluid. Five weeks after operation abdomen was tapped and 8200 cc of fluid removed. Eight weeks after operation evidence of toxemia developed; patient became jaundiced and died.

Case VIII.—Jefferson Hospital, No. I6316. Operation, April 26, 1920. E. O., white, male, aged thirty-three years. No history of the use of alcohol; Wassermann negative; Previous operation four months ago in a New York hospital, apparently for an ascites, six weeks after swelling of abdomen was first noticed. Tapped three times before first operation and about fifteen times between first and second operations. Patient states that he has lost weight; no gastric symptoms; no jaundice; no edema of lower extremities; no hemorrhage. Superficial veins were prominent over the entire abdomen. Urine: specific gravity, 1024; faint trace of albumin. Blood: hemoglobin, 89 per cent; red blood corpuscles 4,550,000 and white blood corpuscles 14,000. Operation under morphin-gas-oxygen anesthesia. The liver

was contracted and studded with small nodules; no evidence of tuberculosis; no enlargement of the spleen; omentum not adherent to old scar, but adherent to parietal peritoneum on the left side. It was fixed about the wound to the parietal peritoneum over an area of about two and one-half by three and one-half inches by stitches passed through the muscle. There were ten postoperative tappings, the first about two weeks and the last about three months after operation. Eighteen months after operation patient is in good health; has gained twenty-five pounds in weight, and there is no evidence of free fluid in the abdomen.

CASE IX.—Jefferson Hospital, No. J4634. Operation, February 15, 1921. J. E., white, male, aged thirty-eight years. No history of alcohol; Wassermann negative. Duration of symptoms, eight months. Cough; dyspnea; loss of weight; edema of lower extremities; no dilatation of superficial veins of abdomen; no jaundice; no hemorrhage. Urine: specific gravity, 1025; faint trace of albumin; occasional hyaline casts. Blood: hemoglobin, 83 per cent; red blood corpuscles, 4,400,000; white blood corpuscles, 9600. Sputum examination negative for tubercle bacilli (five examinations). First tapping less than two months after patient first noticed swelling of abdomen. Tapped eighteen times before operation. Operation under morphin-gas-oxygen anesthesia. Liver was contracted and nodular and adherent to the abdominal wall, the only place that it was free being far around on the right lobe. Numerous recent adhesions. Omentum appeared to be rolled up and adherent across the abdomen. Exploration only; abdomen closed. Reaccumulation of fluid after operation, but the patient was discharged from hospital three weeks after operation in fair general condition. Eight months after operation family physician writes that patient is living, but that abdomen is still distended. He was tapped once

but only a quart of fluid obtained. Present condition is poor.

Case X.—Pennsylvania Hospital, No. 990. Operation, April 27, 1921. N. F., white, male, aged fifty-one years. History of moderate use of beer and wine; Wassermann negative. Duration of symptoms, two months. Cough; loss of weight; enlargement of abdomen; no jaundice; no edema of lower extremities; no hemorrhages; no dilatation of superficial veins of abdominal wall. One preoperative tapping six weeks after swelling of abdomen was first noticed; 1500 cc of fluid removed. Operation under morphin-gas-oxygen-ether anesthesia. Liver contracted and hob-nailed; gall-bladder tense and could not be emptied by pressure; no stones felt; head of the pancreas very hard; spleen enlarged to about three times its normal size; no adhesions. Omentum attached to abdominal wall by four mattress sutures each side of the incision. Postoperative course uneventful. Fluid reaccumulated, necessitating tapping once, this shortly before discharge from the hospital, nineteen days after operation. Patient alive six months after operation and able to do light work. No reaccumulation of fluid since discharge from hospital. Spleen still enlarged. Blood: hemoglobin, 80 per cent; red blood corpuscles, 3,760,000; white blood corpuscles, 6900; red blood corpuscles normal in size and shape; no degeneration.

Bibliography

1. Packard and Le Conte: Am. Jour. Med. Sci., March, 1901.
2. Drummond and Morison: British Med. Jour., September 19, 1896.
3. Talma: Berl. klin. Wchnschr., September, 1898.
4. Ransohoff, Jos., and Ransohoff, J. Louis: Surg. Diag. and Treat., Ochsner, vol. ii, Lea & Febiger, 1921.
5. Mayo, W. J.: Collected Papers of the Mayo Clinic, 1918, vol. x, W. B. Saunders Co.

6. Moynihan, Sir Berkeley: The Spleen and Some of its Diseases, W. B. Saunders Co., 1921.
7. Binnie: Manual of Operative Surgery, P. Blakiston's Son & Co., 1921.
8. Greenough: Am. Jour. Med. Sci., December, 1902.
9. Harris, M. L.: Chicago Med. Recorder, August, 1902.
10. White, Sinclair: British Med. Jour., November 10, 1906.
11. Morison: British Med. Jour., January 20, 1912.
12. Mayo, W. J.: Ann. Surg., 1918, lxviii.
13. Monprofit: French Surg. Cong., 1904.
14. Ludenburger: Die Talmische Operation. Wuerzburg, lxviii, No. 7.
15. Eliot and Colp: Surg., Gynec. and Obst., 1919, xxviii.
16. Riesman, David: Jour. Am. Med. Assn., January 29, 1921.
17. Hertzler: The Peritoneum, vol. ii, C. V. Mosby Co.

NOTES ON ENTEROPTOSIS

By Robert T. Morris, M.D.
New York, N. Y.

The present-day movement toward group diagnosis is gradually disposing of the tendency to treat various phases of general enteroptosis as separate diagnostic entities. A great deal of inefficient medical and surgical treatment, however, is still being applied to these patients. My object in the present paper is to help hold up the hands of men who are insistent upon consideration of a case of general enteroptosis as a whole, something that is not to be divided into smaller parts for symptomatic treatment excepting with the understanding that it is symptomatic treatment only. A number of specialists sometimes take turns with any one general enteroptosis patient, each one giving the patient the hope that when his own resources have been applied to any one feature of the case the patient will then become a normal unit in our social structure. The end result is a dissatisfied patient, a distinct lowering of our standards in methods of correct procedure.

Cases of dilated duodenum in these patients, due to a direct mechanical obstacle caused by a dragging mesentery, are sometimes treated at great length for years by gastro-enterologists when very simple postural exercises would relieve the mechanical obstruction.

Loose kidneys have been subjected to many kinds of improper procedure when the drag upon the nephrocolic or nephrosplenic ligament has pulled one or both kidneys

out of Gerota's capsule. The albuminuria belonging to congestive nephritis following torsion of the kidney blood-vessels, in some of these cases, is treated at length by internists with no attempt being made to limit the range of the wandering of the kidney or to relieve the mechanical causes for the nephritis. Loose kidneys have been fixed many times by surgeons in cases in which this particular feature was not an important one. On the other hand, neglect to fix the kidney in cases in which this complication introduced emergency symptoms has belonged to the history of the subject.

Very many appendices have been removed because of the rather harmless congestive appendicitis going with blood circulation disturbances belonging to relaxation of peritoneal supports of abdominal viscera. Perhaps the most unsatisfactory group of appendix operations have belonged with enteroptosis patients.

Ovarian neuralgia due to an efferent overflow from the spinal-cord center, when an afferent impulse has been sent in excess to the spinal cord from dragging viscera, has led to the removal of ovaries which should not have been touched.

Most of us at various times have done gastropexies or fixation of the colon upon the basis of enthusiastic reports from advisers of these procedures; but how many of us today continue to do these pexies?

General enteroptosis patients are prone to make remarkable response to almost any sort of definite procedure, but they make this response temporarily, because of the power of suggestion and the value of hope due to some procedure which gives temporary relief from some one symptomatic phase of the condition. At the end of a year or so these patients are back again with some new complaint belonging to the orginal condition or introduced perhaps by surgery. General enteroptosis patients belong to a group in which we may commonly find various stigmata of decline with arrested development of various structures of the body.

The endocrine group of glands is particularly prone to show defects. We are to have more and more of these patients, because we are now frankly saving the weak, and the weak will transfer their defects to their progeny. Recognition of this fact is important at the present time, and group diagnosis with deductions from data made by physicians of the best judicial temperament and training will give us the best outlook for the care of these patients.

RECONSTRUCTION OF THE FEMALE URETHRA AND VESICAL SPHINCTER

By Edward H. Richardson, M.D.
Baltimore, Md.

Most surgeons are infrequently called upon to repair local defects in the female urethra and vesical sphincter which are of such a grade as to produce that distressing symptom, incontinence of urine. When suddenly confronted with such a condition, therefore, except it be of the simplest type, one's originality may be sorely taxed to devise a corrective plastic operation which offers reasonable hope of success. And if, under such circumstances, recourse be had to the voluminous literature of the past thirty years upon this subject, only a ripe surgical judgment founded upon a rich experience in plastic work will save one from the lure of a variety of ingenious procedures encountered, which appeal strongly to the imagination, and will insure the choice of one of several possessing inherent worth. Such was the writer's recent dilemma with regard to a patient whose history I shall presently relate, and I thought it might prove profitable to others to report the fruits of my labor and experience in attempting to solve the problems involved.

Purposely, I shall omit from this communication any discussion of the related subjects of exstrophy of the bladder and of urinary incontinence due either to fistulæ situated above the bladder sphincter or to lesions of the central nervous system. My aim is to focus attention upon an

interesting group of congenital and acquired defects of the female urethra and bladder sphincter which are amenable to surgical therapy, and to review critically the operative procedures thus far devised to correct them. Finally, I shall describe a new procedure which I believe has a limited field of application.

Of the various congenital defects associated with urinary incontinence only two, therefore, come within the scope of this paper, namely, epispadias and hypospadias.

Epispadias is characterized by varying degrees of defect in the anterior urethral wall. In all of these cases both the clitoris and the labia are apt to be divided along a mesial vertical plane by a smooth, shallow groove. Three anatomical types may be differentiated:

1. The clitoridal, representing the mildest form, in which the clitoris is divided and the urethra extends forward to its dorsal surface, presenting a terminal cleft.

2. The antesymphyseal, in which there is a greater defect involving fully one-half of the anterior urethral wall, the opening being situated well in front of the symphysis.

3. The total or retrosymphyseal, which is both the commonest and severest form. Here the entire anterior wall of the urethra is wanting and there is usually an associated separation of the symphysis with a funnel-shaped opening into the bladder.

Hypospadias is a congenital defect of the urethra due to an arrested development of the vesicovaginal septum in early fetal life. In these cases the urethra is shortened so that its external orifice is located at some point on the anterior vaginal wall between the hymen and the vesical sphincter. All grades of this anomaly are met with. In one group there is a persistence of the urogenital sinus, in which the vagina and bladder open into a common vestibular tube. In another group of cases a very short urethra opens above in the vagina. And in still a third group, which is the severest type, the urethra is completely divided

so that there is a slit-like communication between the bladder and the vagina.

With hypospadias are frequently associated other congenital anomalies, such as abnormal development of the clitoris, even to pseudohermaphroditism, a double vagina, a double uterus, or various combinations of these.

Acquired defects of the bladder sphincter—alone or associated with urethral defects and resulting in incontinence—may be produced in a variety of ways, which may be conveniently summarized as follows:

1. By a severe local infection, the tissue destruction being brought about through the development of a suburethral abscess or the ulcerative processes of tuberculosis or venereal disease.

2. By excessive dilatation of the urethra and vesical sphincter by means of some object being forced through its lumen in either direction. Such cases have been reported as resulting from (1) coitus per urethram in women afflicted with either a congenital or acquired vaginal stenosis; (2) forcible introduction of excessively large instruments or of an examining finger for intravesical diagnostic or therapeutic purposes; and (3) the passage of a large calculus or of a firm pedunculated tumor from the bladder through the urethra.

3. From obstetrical injury, which may be either obvious or concealed. In the former group there is usually a laceration produced by the injudicious or unskilful use of forceps. I have seen one such case of extreme degree where the unfortunate woman's bladder was torn across 1 to 2 cm. above the sphincter and the symphysis was ripped completely apart. The concealed type of injury is far more common and often does not become apparent until later, when there occurs an escape of urine on coughing, sneezing, lifting or being jolted. Here, during labor, the bladder becomes partly detached from the cervix, its sphincter is damaged, and the subvesical fascia is stretched or torn

beyond spontaneous repair. There is frequently, therefore, an associated urethrocele or cystocele in these cases.

4. From surgical injury, which usually is the result of faulty and unwise operative procedures in unskilled hands, or is an unavoidable sequel to the intensive use of the actual cautery or of radiotherapy in the treatment of malignant neoplasms.

The diagnosis of these various types of urethral and sphincter defects rarely offers any serious difficulty to an experienced surgeon. Incontinence, of course, is the presenting symptom, and the problem is to determine its precise cause. Such central nervous system lesions as tabes, Pott's disease, neoplasms, transverse myelitis and paresis are to be borne in mind and excluded. It is claimed, too, by some writers that renal tuberculosis without apparent bladder involvement may give rise to incontinence. Again, one must not forget those rare cases of ureters, both single and supernumerary, with abnormal orifices, one of which may terminate in the urethra or vagina below the bladder sphincter, giving rise to the paradoxical picture of incontinence associated with periodic voiding of considerable volumes of urine. Finally, the various types of bladder and ureteral fistulæ are to be excluded. In addition to the ordinary methods of examination, therefore, recourse must be had to accurate inspection of the parts and, particularly, to cystoscopy, without which the exact condition of the bladder sphincter, which is the crux of the problem, often cannot be determined.

An interesting and varied assortment of ingenious reconstructive operations have been devised to repair these defects, of which the following deserve consideration:

1. The use of a retention catheter to obtain spontaneous closure of minor urethral defects together with regeneration of the lining epithelium without any suturing whatever. The principle involved here may often be most advantageously employed in conjunction with plastic operations, especially when a several stage procedure is desirable.

2. Thorough mobilization of the defective segment of the urethra, excision of adjacent scar tissue, and end-to-end anastomosis, reinforced by flaps of neighboring vaginal mucosa. Obstetrical injuries of the urethra may sometimes be successfully treated in this way.

3. Efforts to obtain a relative continence by interposing a mechanical obstruction within the lumen through narrowing, lengthening, kinking, or torsion of the urethra by means of a variety of plastic operations. Additional success may occasionally be obtained in this group through the use of a specially devised pessary so constructed as to exert a constant gentle pressure on the urethra. Periurethral injections of paraffin and of human fat have also been employed for the same purpose, but with indifferent success.

4. Complete absence of the urethra, either congenitally or as a result of surgical extirpation, makes it necessary to reconstruct an epithelial-lined tube as a substitute, which will function as a normal urethra. This has been accomplished in most of the successful cases through the use of plastic flaps with broad basal attachment obtained from the neighboring vaginal wall and sutured around a catheter. The exposed raw surface of such a tube may be covered by flaps obtained through partial division and unfolding of one or both lesser labia or, possibly, of the hymen in some cases.

Similar in conception, but possessing distinct advantages, is the method of establishing by blunt dissection a submucous tunnel beneath the pubic arch and along the anterior vaginal wall exactly in the position of a normal urethra. Such a tunnel may easily be so constructed that its posterior end lies accurately in anatomical juxtaposition to the bladder opening, which is highly desirable in order the more easily to unite by suture the margins of the two. In order to maintain the patency of such a tunnel it is necessary to insure its being lined by epithelium. This may be accomplished in at least three ways: (1) By the constant use of

a catheter or bougie until the bladder epithelium grows out and completely lines it; (2) by the immediate application to the tunnel walls of a flap of vaginal mucosa of the proper size and shape obtained from the anterior vaginal wall above the bladder opening; by leaving the base of this flap attached adjacent to the latter it will also, when drawn into the tunnel and anchored, most efficiently bridge the gap between the bladder and the new urethra; and (3) by the use of auto- and homoplastic transplants. These have been used almost exclusively in reconstruction of the male urethra, but there is no reason why they should not be employed also in suitable cases in the female. Successful results have been reported in the male by the transplantation of tubes made of Thiersch flaps or of fascia, or of vaginal mucosa, also segments of vein, ureter or the vermiform appendix. In using the last named it is recommended that the outer coats first be removed and only the mucosa and submucosa transplanted. All such tubes serve a double purpose in that they retard granulation and thus maintain the patency of the canal, while at the same time serving as conductors for the regenerating epithelium which grows out from the bladder. The transplanted tissue is ultimately replaced completely by urethral epithelium.

5. Reconstruction of the bladder sphincter: With few exceptions the older operations had for their chief object the building of a urethra, and little or no attention seems to have been paid to the vesical sphincter. It appears that surgeons were content to bring about a relative continence. Not so, however, with the more recent efforts, all of which have been focussed primarily upon the sphincter region. In general these operations have been of two types: (1) Those which have undertaken to repair and reinforce a damaged bladder sphincter either through intravesical or subvesical plication of the sphincter region and bladder neck; or (2) to provide a sphincter where none exists by encircling the neck of the bladder with a collar of voluntary

muscle consisting preferably of the pyramidalis with its upper fascia attached, although success has been achieved by using segments of the recti muscles, the pubic portion of the levator ani muscles, and even strips from the gracilis and the adductor muscles.

A brief report of the following case seems warranted, because it illustrates admirably a number of the points referred to in the paper. Furthermore, it demonstrates how the success of a well-considered plastic operation may be defeated through adventitious factors.

In September, 1920, Mrs. L. M., aged forty-three years, presented herself seeking relief from total incontinence of urine, which dated from an operation two years previously, consisting of total excision of the urethra and most of the bladder sphincter for a tumor of the urethra supposed to have been malignant. In 1919 an attempt was made by the same surgeon to restore continence, but it failed. Four years ago she was given vaccine treatment for multiple arthritis, and shortly thereafter developed asthma, from which she has suffered severely ever since. At times heroic doses of morphin and chloroform have been required to give her relief. She has been married seventeen years, but has never been pregnant.

The local examination revealed a nulliparous outlet with no disease of the reproductive organs. The entire urethra was absent and 3 cm. back of the pubic arch was a fistulous opening into the bladder 8 mm. in diameter. The margin of this was slightly puckered and the bladder mucous membrane extended quite up to it. Urine was dribbling constantly into the vagina. There was no excoriation, inflammation nor incrustation of any of the neighboring tissues. Covering the original bed of the urethra was a thin layer of vaginal mucosa, quite firmly fixed by scar tissue to the pubic arch anteriorly and to the underlying soft parts posteriorly. Cystoscopic examination showed a normal

bladder and upper urinary tract. On withdrawing the endoscope to the margin of the fistula there was practically no evidence of any sphincter-like contraction over it, showing that most, if not all, of the sphincter muscle had been excised.

Operation No. 1.—On September 21, 1920, the following plastic operation was undertaken: (1) The preparation by blunt dissection of a submucous channel, approximately the length of a normal urethra, extending from the fistulous opening into the bladder forward to the normal location of the external meatus; (2) removal of the right Fallopian tube and of the vermiform appendix through a McBurney incision for the purpose of transplanting an epithelial lined tube into the submucous bed, the outer portion of the tube having been used, I believe, for the first time; (3) a suprapubic cystotomy, through a transverse incision in the skin, deep fascia and bladder, followed by denudation of the sphincter area and the introduction of plication sutures from within the bladder; this, in turn, being followed by the insertion of the prepared segment of Fallopian tube, which was anchored by sutures into position, so that its upper end was encircled by the plicated sphincter zone; (4) accurate adaptation from below of the transplanted tube to the prepared urethral bed, followed by plastic closure of the fistulous opening by uniting its margin to that of the new channel.

The first three steps of this operation were most happily and satisfactorily completed when a lamentable accident occurred. At the conclusion of the first step in the operation, one end of a long rubber tube was passed through the submucous tunnel into the bladder fistula while the rest of the tube was brought out over the patient's thigh and allowed to hang down over the side of the table. This tube was intended to serve a double purpose: first, to permit ready distention of the bladder with air, in order to facilitate the suprapubic operation, and, second, to act as a telescopic

guide for insertion of the transplanted Fallopian tube into position. Unfortunately, someone anchored the rubber tube by means of a safety-pin to the patient's ether stocking to prevent its being pulled out. This pin was overlooked in the final change of posture from dorsal to lithotomy, so that the rubber tube was stretched taut across the patient's thigh as the latter was being elevated, and the Fallopian tube, which had been so carefully adjusted, was torn from its position and pulled entirely out, thus defeating the main purpose of the operation. There remained no alternative but to introduce a rubber catheter through the submucous channel into the bladder and then close the fistula at the bladder end of the new urethra.

Nine days later leakage through the closed fistula occurred for the first time. Inspection of the field of operation on the sixteenth day showed that the attempt to close the fistula and thus form a continuous channel through the new urethra had failed and that all of the urine was escaping through the old opening. The submucous channel was patent throughout, however, with an average diameter of 6 to 7 mm., and was beautifully lined by epithelium, which had grown out from the bladder, thus demonstrating that it is possible to obtain perfect epithelialization of such a channel without actual transplantation of an epithelial lined tube. This observation will prove of great value in similar cases in the future.

We now had a perfectly constructed urethra of normal length, lined by epithelium, with its external orifice at the normal location of the external meatus. The problem was to connect it to the bladder, close the fistula, and to get a functioning sphincter.

On October 12, 1920, nineteen days after the first operation, a plastic operation was undertaken to accomplish these three things: First, the transverse diameter of the new urethra over its proximal one-half was enlarged sufficiently to receive an inverted flap of vaginal mucosa, which was

dissected up from the anterior vaginal wall just beneath the bladder neck and left attached along the upper margin of the fistula. When drawn into the urethra and anchored by mattress sutures this flap bridged over the fistula quite neatly and formed a continuous channel from the bladder through the urethra. Plication sutures were then placed in the neck of the bladder in an effort to reëstablish sphincter control and the wound in the anterior vaginal wall was closed from side to side. A retention catheter was passed through the urethra into the bladder. Owing to the poor circulation of the flap, however, it later sloughed away and the fistula reopened.

Twenty-four days after this second operation, at the patient's urgent request, a third attempt was made to obtain some measure of bladder control. Inspection now showed that the posterior half of the new urethra had participated in the slough and that no reasonable hope could be entertained of successfully connecting the remaining short urethra to the bladder. Accordingly, it was sacrificed. An inverted T-shaped incision was then made, extending from the cervix along the middle of the anterior vaginal wall up to and partly encircling the fistula anteriorly. The vaginal walls and subvesical fascia were then dissected from the bladder, so that the latter was freed from all scar tissue over a zone surrounding the fistula which averaged 2 cm. in width. Fine silk sutures were then used to plicate the bladder wall beneath and on either side of the opening. When tied these narrowed the latter so that it gripped tightly a catheter 4 mm. in diameter. The subvesical fascia was then approximated from side to side in such a way as to further splint the sphincter region and to build up a short urethra. The vaginal wall was similarly utilized.

Following this operation the patient had by far the worst asthmatic attacks that she experienced during her entire hospital stay. One of these continued without interruption for four days, requiring the liberal use of powerful anodynes

and antispasmodics, including the frequent use of chloroform, to control it. The coughing was intractable and very severe. The catheter was removed on the fifth day, and during the following twenty-four hours the patient several times voided considerable quantities of urine, at one time as much as 160 cc. The incessant coughing, however, caused all of the sutures to slough out, so that the final result was little if any improvement over the condition existing at the outset. Possibly later I shall make a further attempt under more favorable conditions.

Conclusions. The conclusions which I have drawn from the studies upon which this brief *résumé* is based are as follows:

1. Congenital or acquired defects of the female urethra and bladder sphincter associated with urinary incontinence, while relatively uncommon, are, nevertheless, prevalent enough to be occasionally encountered in every active surgical clinic.

2. The successful correction of such defects may challenge the skill and ingenuity of even the most experienced plastic operators.

3. The plan of operative therapy should be dominated by the necessity of reconstructing an efficient bladder sphincter. To this end it is of fundamental importance to release from inhibiting scar tissue, jealously preserve, reunite and reinforce by either intra- or extravesical plication sutures any existing sphincter rudiments or remnants. If there is complete absence of the sphincter, the construction of a compressor of the vesical neck through transplantation of the partially detached pyramidalis muscle together with its anterior fascia or of the pubic portion of the levator ani muscles is the operation of choice.

4. Reconstruction of the urethra is best accomplished by the simple submucous tunnel operation, followed by the use of a retention catheter, until epithelialization occurs

from the bladder. When an excess of scar tissue or other disadvantageous local conditions imperil the success of this procedure, the value of the various plastic flap operations alone or in conjunction with transplanted epithelial tubes has been repeatedly demonstrated. The use of the Fallopian tube for this purpose, as attempted in my case, is, I believe, original and possesses distinct advantages.

5. As in all reconstructive surgery, the frequent superiority of a several-stage procedure must be borne in mind.

DISCUSSION ON THE PAPERS OF DRS. THOMPSON, BAER, COLEMAN, GIBBON, MORRIS AND RICHARDSON

Dr. Stephen H. Watts, Charlottesville, Va.—While the lantern is in use I should like to show one case in connection with Dr. Coleman's paper. All of his cases were examples of hypoglossofacial anastomosis, which is probably the best operation in cases of peripheral-nerve paralysis, owing to the fact that the cortical representation of the facial and hypoglossal more nearly coincide.

This case, which I had about ten years ago, was one of peripheral-nerve paralysis which had existed for about two years and in which the etiology could not be definitely determined. This is a picture of the case (illustrating) before operation showing the facial asymmetry, the drawing of the face to the nonparalyzed side. The facial nerve was anastomosed to the spinal accessory. The next picture shows her nine months after operation with little if any asymmetry. At this time the patient was able to close the eye, but there were associated movements of other muscles of the face, and shrugging of the shoulders was accompanied by movement of the face muscles. The next picture shows the patient thirty-two months after operation. The face is quite symmetrical and she can shrug her shoulders without contracting the face muscles, but there are still associated movements of the other muscles of the face when she closes the eye.

Dr. Edward H. Ochsner, Chicago, Ill.—Personally, I am very grateful to Dr. Baer for the report of these 50 cases he has presented, and I agree with him in the first two conclusions, but I cannot agree with the last. My experience convinces me that the transplantation operation in tuberculosis of the spine has a greater mortality, greater morbidity and greater deformity, and there is a longer period of convalescence than by the old-fashioned Sayre cast method of treatment which was in use long before the Albee method was introduced. I am more convinced of this than ever since listening to the paper of Dr. Baer. I am not able to present any statistics offhand, but I do know that in cases in all stages treated by proper-fitting casts over a stockinet, properly applied, so that the weight of the upper portion of the body is borne by the pelvis and not by the centers of the vertebræ, the deformity is practically never increased after the treatment has been begun. In fact the deformity in the great majority of cases actually becomes much better during the treatment, and I am also convinced by these statistics that the period of convalescence is shortened; that the danger of death and the actual morbidity are much smaller by the old-fashioned method of treatment. I have never done the Albee operation. I have never seen a case in which I thought it was indicated.

Dr. Arthur A. Law, Minneapolis, Minn.—Dr. Lewis has quoted one of my cases which proved an exception to the rule, a case of neural tubulization which I had done eight or ten years ago. I had done a great deal of experimental work on the lower animals in the laboratory in neural tubulization and it had proved to be nearly universally successful in them. We were able to get regeneration of the proximal neuraxons, which bridged gaps in the nerves of 2 cm. and 3 cm. in lower animals by tubulizing the nerves with autogenous fascia lata tubes.

When the case we are quoting presented itself for relief following an injury to the musculospiral nerve and an ununited fracture of the humerus it had several features which were of some interest. The ununited fracture had been operated on by a colleague who used an intramedullary bone-graft. He had failed to crowd the bone-graft far enough beyond the eburnated bone to contact with viable bone and the fracture did not unite. In attempting to repair this condition later

on we did an inlay in this man's midhumeral region. He had a complete musculospiral paralysis and had had it for two years. He had no control whatever of any of the muscles supplied by the musculospiral nerve. We dissected out the musculospiral nerve around the bone and found there was a loss of 3 inches of the nerve. We could not mobilize or transplant the nerve enough to bring the ends together, so I had no alternative but to do what I had repeatedly done on lower animals in my experimental work, namely, tubulization of the nerve. I do not advocate it but it can do no possible harm to try it, and in the occasional case a remarkable recovery justifies the operation. I do not teach it, but in this instance there was no possible way of supplying the deficiency in that nerve except by doing an autogenous transplant of a sensory nerve or by making a transplantation and tubulization of fascia lata. This latter we did, bridging a 3-inch gap in the nerve which was left after the proximal and distal neuromata had been removed. At the end of eighteen months he had practically complete restoration of function. Not only that, but he had an osteomyelitis of his metacarpal bones at the time of operation, so he got an infected wound; yet in spite of a chronic infection he made a complete recovery, his three grafts survived in the presence of the infection and he got complete regeneration of the musculospiral nerve.

This is one of the classical cases in which this method of tubulization proved successful in the human subject. I have never tried it since. I am familar with the literature which emanated during the war, and these autogenous transplants, as a rule, have not been successful; but this one case proved the exception to the rule.

Dr. W. A. Bryan, Nashville, Tenn.—Dr. Thompson's paper was interesting to me from the standpoint of measurements of these cases. My work on harelip and cleft palate is all done by ear.

I want to call attention to several things. Dr. Thompson pointed out the fact that it is necessary to have the nostrils of the same size, and it is also necessary to have the nostrils on the two sides on the same horizontal level. In cases of this kind we ought, every time a portion of the lip projects beyond the nose, to replace the os incisionum so that it will not give the patient a flat upper lip.

This girl (showing slide) was operated on when she was fourteen years of age. Her nostrils are of the same size. I do not think it is advisable to operate on patients past twelve to fourteen years of age if we can help it, because one is not likely to get as good results as in younger patients.

Here is a girl (indicating) with harelip. This is the same girl after operation.

Here is an ugly case of harelip and this is a picture of the same child after union has taken place. In that case I got a satisfactory nose.

This is another case that had unilateral harelip. (Dr. Bryan showed slides of other cases of harelip before and after operation.)

Dr. Charles G. Mixter, Boston, Mass. (by invitation).—I want to take this opportunity to thank you for the privilege of listening to these papers, particularly the paper of Dr. Thompson, which is interesting to us because at the Children's Hospital in Boston we see a considerable number of deformities such as harelip and cleft palate. We have used for a number of years the compass and clamp for accurate measurement and incision of the lip. The greatest difficulty we find, however, as Dr. Thompson said, is in the curling of the ala properly and in bringing the floor of the nostril anteriorly to a right angle with the plane of the lip. This we find in our experience cannot be accomplished by any clamp as yet devised, and it depends on free incision. Any form of measurement that will tend to make that approximation more accurate is a great step in advance.

We prefer to operate on our cases between four and eight weeks of age in order to approximate the alveolar process and close the lip while the bones are still plastic. In the severe cases of double harelip we feel if the approximation is attempted and is successful at the expense of flattening of the upper lip, as the upper jaw grows, the flattening will be more accentuated, and for that reason we try to obtain a lip full and freely movable after it has been approximated. This will pull the premaxilla into position and give a more sightly lip. There are certain cases, however, in which a proper surgical operation is one in which the cosmetic side to a certain degree should be eliminated. Cases of malnutrition we send to the medical service, and they are in turn taken back to us after proper feeding, and in these cases we simply approximate the lip in

the quickest manner possible and with little shock. Frequently we do one side at the first sitting and a second operation in two or three weeks to close the opposite side. To save the life of the baby is the most important thing, and there is a definite mortality following operations on harelip in very young children with malnutrition.

Dr. Herbert P. Cole, Mobile, Ala.—It occurs to me to mention a procedure which I have followed several times, although it is not original with me, in the preparation of these cases for operation, and specially in cases of double harelip. In operating on such a case it is well to close the orifice of the mouth to about half the breathing intake the child has had before, and taking that into consideration and the danger of asphyxiation due to the lessened intake, any method that will accustom the child to the diminished intake will be logical.

If one can prevail upon the mother for a week to ten days before the operation to keep a piece of adhesive plaster across the child's upper lip by bringing both cheeks together he will accomplish not only the diminishing intake before operation so that the child is accustomed to it afterward, but he will lessen the danger of asphyxiation, which is a definite danger. In addition to that, in a case of double harelip one brings the lip flaps and premaxilla into approximation which gives him a more definite method of making measurements at the time of the operation. These flaps will come together after the use of adhesive plaster.

Another point is to accustom the child to being fed with a teaspoon instead of being nursed before operation.

Dr. Robert L. Payne, Norfolk, Va.—I have listened with both interest and profit to these papers and I have been particularly interested in omentopexies practically during all my short surgical career.

During the years 1906 to 1910 I did three omentopexies which were failures. At the 1910 meeting of this Association in Nashville the late Dr. Maurice H. Richardson read a paper on omentopexy in which he reported 8 cases, only 4 of which were successes. A number of other men in the discussion reported more or less similar results to those of Dr. Richardson, and I was encouraged again to try some of these operations, with the result that between 1910 and up to two years ago

I did 8 omentopexies which I reported in an article published two years ago. Of the 8 cases 5 of them showed good results; 3 of them showed permanent results and 2 partial results. Two of them had to be tapped more or less at frequent intervals. The question came up as to what is the best mode of procedure in operating on these cases, and I think Dr. Gibbon struck the keynote when he said intra-abdominal manipulation was probably the greatest drawback to the first series of operations done for this trouble. One of the cases we operated on died about three months after the operation, where a transplant of the omentum was done in front of the rectus muscle but underneath the rectus fascia. Logically that should be the best place for a transplant of the omentum because of the vascularity of the muscles and anastomosis of the epigastric and internal mammary.

I had an opportunity to "post" the case that died and we were surprised to find that there was no result from the omentopexy and the vessels in the omentum had been obliterated and nowhere showed any tendency toward dilatation or anastomosis or the establishment of an extravenous circulation. It occurred to me that probably pressure between the recti and the fascia in front obliterated the vessels in the first instance and they had no chance to establish collateral circulation. So I then in 2 cases resorted to transplantation of the omentum according to the operation described by the essayist between the peritoneum and the muscle. This gave us a better result, and we believed that frequent tapping following the operation, not waiting until the abdomen became tense, but tapping before it filled up tightly, prevented pressure from within against the omentum and vessels and probably helped in the establishment of collateral circulation.

Since that paper, two years ago, I have had 3 more cases, and to circumvent the possibility of compression of the vessels in the transplanted omentum we have followed the technic of dealing with the omentum through a hole in the abdominal wall, the transplant being partly under the skin but in front of the fascia. In these 3 cases the results have been better than in others, but we believe in addition that the frequent tappings for the prevention of tension of the abdominal wall and pressure of the transplanted omentum had probably some important bearing on the results.

Dr. James E. Thompson, Galveston, Texas (closing the discussion on his part).—I intended in my paper to deal almost entirely with the nostrils. It is not a difficult matter either to restore the vermilion border or to make the lip deep enough. But it is a difficult matter to restore the nostril, which is the most salient feature of the face, in a satisfactory manner. The first step should always be to mold the two halves of the maxilla so as to bring together the edges of the fissure and restore the pyriform aperture of the nose. This forms a foundation on which the repaired lip and nostril will rest. Without this foundation the lip and nostril will sag and flatten out, as time passes, even after a most perfect plastic operation. Repair of the lip without previous molding will always be followed by gradual narrowing of the alveolar fissure. Sometimes the fissure will be quite obliterated by the contraction of the facial muscles. It is, however, my strong opinion that the final result is better when the jaws are forcibly molded before the lip and nostril are repaired.

The photographs of the lip and nostril were taken within ten days of the operation, soon after the removal of the stitches, in order to show up all mistakes and to facilitate critical study. My final results have improved steadily since I used careful measurements.

Dr. Baer (closing the discussion on his part).—I have not only studied my own cases, but as a member of the commission we have studied the cases in Boston and in New York, and I think in general the results of that investigation are practically the same as those obtained in my own cases.

In regard to the adult cases referred to by Dr. Ochsner, I would say that I have been remarkably surprised at the quickness of the recovery with an operation rather than without it. These cases, of course, do not have a deformity that the children do, and the probabilities are the quickness of the recovery is due to a change in circulation which is brought about by the graft on the spinous processes. If we resect a knee-joint for tuberculosis we do not remove all the tuberculous process, yet the joint gets well very quickly. While resection of the joint may not be quite analogous in this instance there is a change in the circulation probably through the spinous processes into the vertebræ which increases the circulation, and this helps to care for the tuberculosis. The

fact remains that the adult cases should be protected for at least six months, but many of these cases get well very much quicker than they did by the older method.

Dr. Coleman (closing the discussion).—In 1919, I reported a series of 132 peripheral-nerve operations in which autogenous transplants were used seven times. In this report I called attention to one autotransplant of a median defect of 7 cm. Four months after the transplantation, there being no evidence of improvement and the futility of nerve transplantation having been demonstrated, reoperation was done for the purpose of attempting a direct suture. There was definite evidence of permeation of the transplant for a distance of 2 cm. by the axons of the central segment, so that it was possible to utilize the permeated transplant and effect a direct suture without hurtful tension. Dr. Lewis has spoken of this method of utilizing the central end of a transplant to effect a direct suture at reoperation. None of the cases of autotransplantation that I have been able to trace privately have shown any return of function.

In reference to the case of spinofacial anastomosis reported by Dr. Watts the question of reëducation to bring about return of facial expression is an interesting and complicated problem. Whether the facial area remains permanently disconnected and has its function taken over by the tongue or accessory area, or whether the facial centers through associational tracts continue to dominate the fused nerves is not known. In young patients it would seem that the prospect of recovery of facial expression is greater than it is in older people.

The method of temporary suture of neuromata to overcome a long-distance defect, spoken of by Dr. Kerr in his discussion of Dr. Lewis's paper is a very important procedure, and usually enables the operator to avoid transplantation.

A great deal of confusion as to the results of operative procedure upon the nerves is due to inaccurate interpretation of the movements of the limb after operation. Some form of substitutionary movement is provided for the great majority of paralyzed muscles, and unless the examination is so conducted as to determine whether or not each individual muscle is contracting the results of operation are likely to be misinterpreted.

SADDLE NOSE

By Vilray P. Blair, M.D.
St. Louis, Mo.

Fig. 1, *a* and *b*.—Show front and side views of a patient with a depression in the bridge of the nose following an early injury. It was corrected by a cartilage insert let in through a spectacle-bow incision, giving the result shown in Fig. 1, *c* and *d*.

Fig. 2, *a* and *b*.—Side views showing before and after a cartilage transplant for a destruction due to intranasal ulceration.

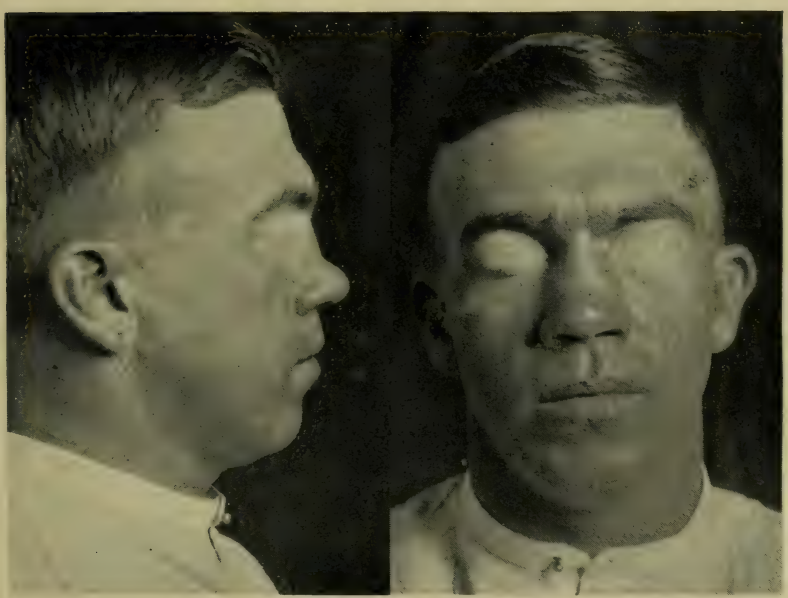
Fig. 3, *a* and *b*.—Show deformity due to scarring of the nasal mucous membrane, probably caused by early ulceration. The lining was prolonged by a flap taken from the forehead, split in two at the end and brought down through an incision across the nose, one-half lining one side and one-half the other. Later the flap was cut and the part not needed was returned to the forehead, a skin graft being done at the same time. This procedure not only made the lining but lengthened the external surface of the nose. Fig. 3, *c* and *d*, show the result in this case.

Fig. 4, *a* and *b*.—The same type of face is seen in Fig. 4 as in Fig. 3. The same methods were used for correction, giving the results shown in Fig. 4, *c* and *d*.

Fig. 5, *a* and *b*.—Shows a deformity similar to that in Figs. 3 and 4. In this case, to avoid scarring the forehead, the prolongation of the lining of the nose was obtained by means of a flap from the arm. Later the depression in the

FIG. 1

a *b*



c *d*

FIG. 2

a *b*

FIG. 5

a *b*

FIG. 3

a *b*

c *d*

FIG. 4

a *b*

c *d*

FIG. 6

a *b*

c *d*

FIG. 7

a *b*

c *d*

FIG. 8

a *b*

c *d*

FIG. 9

a *b*

c *d*

bridge of the nose was raised by the insertion of a piece of cartilage, giving the result shown in Fig. 5, *b*.

Fig. 6, *a* and *b*.—Shows a girl, aged nineteen years, with loss of lining and tip of nose, due to late ulceration. A flap was taken from the forehead, brought down into the nose through an incision. The end of the flap came out and lay over the tip of the nose, skin surface out, thus forming a covering for the small slit seen in the end of the nose in Fig. 6, *a*. Later, this end was cut from the remainder of the flap far enough up to allow it to be brought down and form the columella. The result is seen in Fig. 6, *c* and *d*. A cartilage transplant is still needed to raise the bridge.

Fig. 7.—In *a* and *b* are shown front and side views of a case with destruction of nose due to use of a cancer paste. Two flaps were taken from the forehead. One in which a piece of cartilage had been transplanted was turned-down, raw surface out, into the defect, forming a lining. The other flap was then turned down over this, skin surface out, to make the covering. Fig. 7, *c* and *d*, show the result. The forehead was skin-grafted.

Fig. 8.—*a* and *b* show the front and side views of a case in which the bridge of the nose and left malar prominence were destroyed by gunshot wounds. The correction consisted of the implantation of cartilage into the forehead. The lining and covering flaps were obtained from the forehead. A plastic was done on the cheek. The result is seen in Fig. 8, *c* and *d*.

Fig. 9.—*a* and *b* show a loss of the tip of the nose and an obstruction of the right nostril, caused by an automobile accident. A flap was taken from the forehead with a piece of cartilage implanted in it. This was transferred in a pedicle flap, the outer skin of the nose being used as a lining for the new nose. The first flap was cut from behind the ear; but the blood supply was not sufficient, therefore it could not be used. The results, thus far, are shown in Fig. 9, *c* and *d*. The case is still unfinished.

DISCUSSION

Dr. Samuel J. Mixter, Boston, Mass.—There are very few of us I think who will attempt to vie with Dr. Blair as an artist on the subject of nose-building. Plastic work in general is very interesting, and I want to speak of one point that the reader of the paper has not alluded to in the reconstruction of noses and the righting of all sorts of defects about the face especially. In a great many of these cases we have so much scar tissue that it is very difficult to do anything with the parts in the neighborhood. Besides, flaps from the forehead always leave scars however well they are brought together. So I have used in large defects of the face, the nose and the eyes, after bad burns and things of that sort, jump-flaps. Jump-flaps, if you are not in a hurry and the patient can be made fairly comfortable, although an irksome process, are certainly most useful. A flap of any size almost can be taken from the abdomen and conveyed by the wrist to any part of the face. It requires fixation of the arm for a while in an awkward position, but one can get a perfectly pliable flap and one that he can make large enough, and then he has the pleasure of working out the nose or eyelid or anything the same as a sculptor does with a lump of clay or wax. It is so simple, so easy, if one takes the time and has the patience to do it, and one can do all the fine work later, the artistic finishing touches, without any anesthetic or at the most a short, light local anesthetic, and can get wonderful results.

One of the most important things is to make your original flap very large. After you cut the flap off, bevel it and bring the edges together so that you have skin all round it. If you leave it attached long enough it will all live. How long that needs to be left I do not know, but I think by treating it occasionally with clamp forceps you can tell when it is going to live. Personally, I like to leave them a month.

Dr. James E. Thompson, Galveston, Texas.—I cannot allow this paper of Dr. Blair to go by without a word of compliment. I always listen to him with marked attention because he is always instructive and original. He has most of us so completely outclassed with his remarkable results that it would be superfluous to attempt to add anything to his contribution.

Dr. C. C. Coleman, Richmond, Va.—I should like to speak about anesthesia in these cases. I have found that the cumulative dread of a general anesthetic has proved an obstacle in some cases of plastic work about the face where repeated operations were required. So intense has the dread of a general anesthetic become that the patient may refuse the final steps necessary to make the operation a complete success.

Many operations about the face are peculiarly suited to block anesthesia. Naturally the operations involving restoration of the bony framework of the face, such as Dr. Blair has shown, will require a general anesthetic. In operations for "saddle nose" in adults, even with loss of skin and mucous membrane, the entire series of operations may often be done under block anesthesia.

Harelip operations in adults are very satisfactory when both infraorbitals are blocked with novocain and adrenalin. Infiltration anesthesia in the region of a plastic operation has definite objections, in that it distorts the tissues and interferes with perfect approximation.

Dr. Blair (closing the discussion).—I wish to thank Dr. Mixter for calling attention to the jump-flap. It is useful, but there is no skin that quite equals the face skin. That is why I have not used it. A number of these cases were done with a local anesthetic. One of them was a lip case. My experience with local anesthesia where you run a number of operations is that the patients are more liable to call a halt on local rather than general anesthesia. They get weary of local anesthetics. Ether for our face cases is given with an intratracheal catheter. The anesthetist is well out of the way and the average patient is better satisfied with general rather than local anesthesia even though he has no pain under either type of anesthetic.

A CONSIDERATION OF SOME NONTUBERCULAR KIDNEY INFECTIONS

By Raymond P. Sullivan, M.D.
New York

Infection of the kidney by pathogenic microörganisms may take place by way of the urinary passage, the lymphatics or the general circulation. The hematogenous route is especially important on account of its often obscure starting point and its production of a great variety of local lesions. The infectious agents in the blood stream reach the kidney through the renal capillaries, in the form of a single bacterial species, in pure culture or as a mixed infection. Albarran's statement still holds good, that with the exception of lesions produced by the tubercle bacillus our knowledge of other renal infections is as yet incomplete. The three observations of nontuberculous kidney infections, reported in the following, concern a case of kidney carbuncle, a fulminating acute, and a chronic dead kidney. All three cases were the result of hematogenous infection of the organ with pus-producing bacteria.

A great significance must be attached to hematogenous infection of the kidney, which is the eliminating organ for microbe in the general circulation, and is therefore liable to damage through the bacteria themselves or their toxic products. The starting point of kidney infections is extremely variable and often situated at a considerable distance from the organ. The cortical lesion of the kidney or localization of the blood infection, from which the peri-

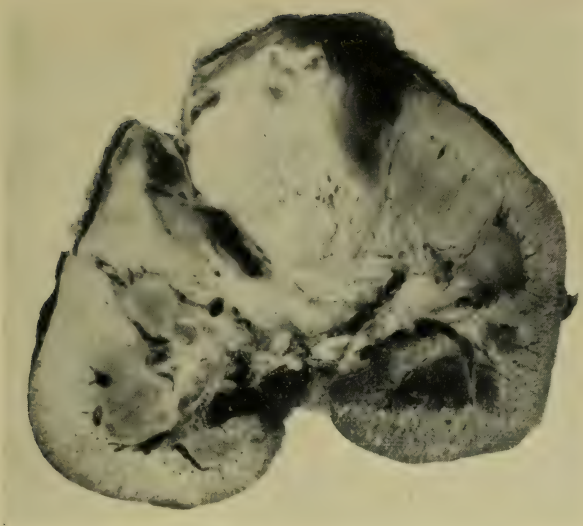


Fig. 1.—Kidney carbuncle. (Cross section.)

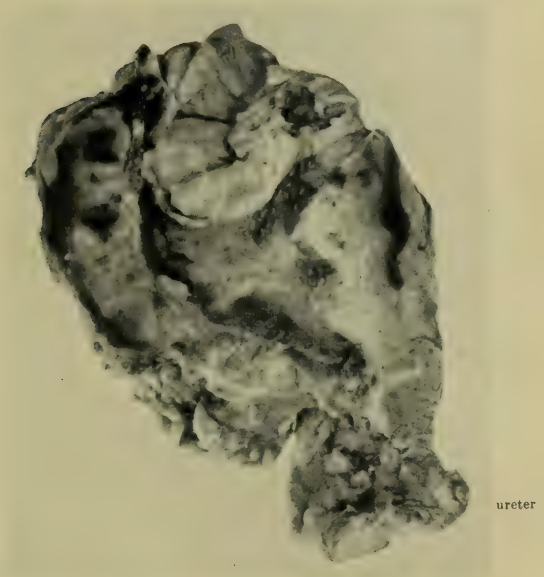


Fig. 2.—Terminal pyelonephritis, dead kidney. (Cross section.)

renal suppuration originates, may be so small as to escape detection even at the time of operation. These metastatic infections will give rise either to diffuse suppurative nephritis, to focal suppuration within the renal cortex, or to perirenal or pararenal suppuration with a trifling cortical lesion. All these conditions are merely different degrees of one identical process, namely, the localization in the renal cortex of pathogenic agents which have been carried there by the blood stream in the course of bacteremia, usually staphylococcus bacteremia. Metastatic hematogenous infection of the kidney, or perinephritic abscess, secondary to a small pus focus elsewhere in the body, is not always easily recognized, but, on the contrary, in acute cases lends itself readily to confusion with acute intra-abdominal infection.

The name, metastatic carbuncle of the kidney, was first applied by Israel to metastatic hematogenous abscess of the renal parenchyma and perinephritic abscess, which may follow upon practically all suppurative or infectious processes of the rest of the body, especially boils and felons. An instructive example of perinephritic abscess which was later found to have an associated carbuncle of the kidney recently came under my own observation and offers a good illustration of this not uncommon hematogenous origin of kidney suppurations.

Case I.—The patient, a young man aged nineteen years, sustained a punctured wound of the left forearm, which became infected and was incised by his physician. Some days later he began to complain of severe pain in the mid-abdominal region and was referred to me at St. Vincent's Hospital. This pain finally became localized under the left costal margin, with occasional sharp twinges radiating down the left thigh. On the third day of the abdominal pain the patient had a chill and his temperature rose to 103° F. Murphy's sign was present in the left costo-vertebral angle. Urinary symptoms were altogether absent.

The diagnosis was perinephritic abscess and the treatment consisted of incision and drainage. The Staphylococcus aureus, which had previously been recovered from the infected wound of the forearm, was also recovered from the kidney pus. His postoperative course was quite irregular. Temperature after operation dropped to 101° F., but on the third day it rose again to 103° F. Drainage was satisfactory for eight days, but his irregular temperature and negative digital exploration of sinus for pus pockets, together with negative urinary findings, suggested further urologic investigation. Cystoscopic examination by Dr. Herbert Mohan, on the thirteenth day postoperative, revealed equal function from both kidneys. The urine was still free from pus and bacteria. However, a pyelogram of the left kidney showed a small renal pelvis, with upper and lower calices long and narrow, but no sign of middle calyx. The following day left nephrectomy for carbuncle of the kidney was done, and the patient made an uneventful recovery. His present condition shows absence of all symptoms and a gain of forty pounds in weight. The value of urologic examination after drainage of a perinephritic abscess, where the patient presents signs of a continued sepsis, cannot be overemphasized.

The specimen of this solitary staphylococcus suppuration in the kidney, derived from a remote pus focus, is very striking. The organ is the seat of a peculiar lesion which in color and consistence contrasts so sharply with the surrounding healthy tissue as to suggest a newgrowth rather than a suppurative process. Beginning in the renal cortex near the surface the process has developed essentially at the expense of the cortical tissue, advancing toward the central area of the kidney. (Fig. 1.)

Similar conditions existed in Israel's classical case of metastatic carbuncle of the left kidney, observed in 1891 and reported ten years later in his *Klinik der Nierenkrankheiten* (1901). He emphasizes that this observation concerns

the first case on record in which this process of metastatic infection by the blood stream could be demonstrated, and points out that undoubtedly hematogenous infection may be restricted not only to a single kidney but even to a circumscribed portion of the organ.

A different and more advanced degree of metastatic hematogenous infection of the kidney is represented by a personal observation in a case of acute fulminating kidney in a man aged fifty-seven years.

Case II.—The patient, twenty-four hours before admission to St. Vincent's Hospital, was suddenly attacked by sharp pain in the lower right lumbar region, radiating into the right groin and the testicle. These painful attacks lasted half an hour to an hour and were repeated several times daily, becoming progressively more severe, and associated with vomiting, nausea and hematuria. He gave a history of an accident, several years previously, in which his right hip and a rib were fractured, and remembered a sudden attack of sharp pain in the lower right quadrant in the course of convalescence.

Cystoscopic examination by Dr. Mohan revealed considerable pus coming down from the right kidney. The function of the right side was considerably lower than the left. Right pyelogram showed a marked dilatation of the pelvis and ureter with indefinite obstruction in the lower third of the ureter about one and a half inches from the bladder; one small scratch on the right ureteral catheter. The general condition of the patient became more serious every hour and operation was advised. The next day nephrectomy was done. The kidney was found to be considerably enlarged with several areas of subcapsular hemorrhage. At the center there is a large soft area, bluish black in color, about the size of a walnut. The pelvis is greatly distended. No evidence of calculus or stricture was found. The ureter likewise considerably distended and an associated

periureteritis extended from the lower third up to and involving the pelvis. Pathological examination of the kidney showed marked changes of acute pyelonephritis, with an exudate of pus in the ureter and pelvis extending into the parenchyma, involving the tubules and interstitial tissues and extending up to the renal cortex. The patient's recovery is especially gratifying in view of the fact, as emphasized by W. J. Mayo, that in the fulminating type of hematogenous pyogenic infection, unless nephrectomy is done, death may result within a few days.

Observations like the foregoing are more or less suggestive of latent microbism, a problem which attracted much attention during the World War in connection with the healing of wounds. In Brewer's case of acute hematogenous infection of one kidney, in a woman aged twenty years, the condition was preceded about three weeks by double femoral fracture and multiple contusions of the body.

Case III.—The following case of chronic infectious nephritis and pyelonephritis, culminating in "dead kidney," occurred in a man aged seventy years, whose distressing condition was greatly relieved by drainage of the pus. This patient had suffered five years from urinary retention, and when first seen had a persistent sinus of the right kidney of two years' standing with a suprapubic fistula of the same duration. Three years previously he was taken suddenly ill with pain and tenderness in right hypochondrium and lumbodorsal region. This later proved to be a perinephritic abscess, which was opened and drained through an anterior incision. At the same time the operating surgeon performed a suprapubic cystotomy, evidently because of his attacks of urinary retention. His convalescence was protracted because of remittent fever and backache. The kidney sinus finally healed but opened again, one year later, just after a prostatectomy by still another surgeon. When first seen by me the patient was bedridden, presenting two

discharging sinuses, one from the kidney incision and the other from the suprapubic. There was a constant discharge of pus and urine from a urethral catheter which was kept in the bladder. Cystogram revealed his bladder capacity of about one dram. He was considerably benefited by our first treatment, which consisted of enlarging the kidney sinus and removing several sloughs. About six weeks later right nephrectomy was performed and a dead kidney removed. His convalescence was quite satisfactory except for a persistent fistula which was found to lead to the ureter stump. Seven weeks after the nephrectomy our secondary operation was performed to remove the ureteral stump containing a calculus. Notwithstanding his advanced years and prolonged sufferings, the patient finally made a good recovery, gained in weight, and was able to go about with all fistulæ closed. His bladder capacity on discharge was sixteen ounces. The findings on macroscopic and microscopic examination were as follows:

Macroscopic Examination. The specimen consists of a right kidney. With the surrounding fat it measured 12 x 9 x 4 cm. The kidney proper measured 9 x 3 x 2.5 cm. It is very irregular in shape and nodular. The parenchyma is almost completely replaced by fibrous tissue, containing several small cysts near the surface. The pelvis and upper part of the ureter are greatly dilated and surrounded by adipose tissue. The mucous membrane of the pelvis is rough and covered with grumous exudate. (Fig. 2.)

Microscopic Examination. The sections show most of the glomeruli to be completely obliterated and replaced by hyaline connective tissue; some show beginning fibrosis with a thickened Bowman's capsule; none appear to be normal. The tubules show the various stages of degeneration from a granular change in the epithelium to complete destruction. Some of the tubules are cystic and contain an exudate consisting of pus cells and granular material. The interstitial tissue shows generalized lymphocytic in-

filtration. Many areas show localized infiltrations consisting of lymphocytes, polymorphonuclear neutrophiles, plasma cells and eosinophiles. There are several areas of extravasated blood of recent formation. The mucous membrane of the pelvis is replaced by a membrane consisting of plasma cells, eosinophiles and lymphocytes. There is considerable perivascular infiltration throughout the organ.

Although serious lesions like those described above, calling for the removal of the infected organ, are a frequent sequel of the penetration of pus-producing bacteria, it is entirely possible for the ordinary pyogenic microörganisms, especially the staphylococcus, to pass through the kidney without necessarily giving rise to important anatomical lesions.

Pathology.—The pathogenesis of deep abscess in general and perinephritic suppuration in particular was not well understood prior to Pasteur's discovery of the staphylococcus in the pus of furuncles and its demonstration as the responsible agent in these and other suppurative processes (1881). Some years later Verneuil, in France, pointed out on the basis of an illustrative observation that the germs of furunculosis may find a favorable culture medium in a weakened organism and may multiply freely at a considerable distance from their primary focus, giving rise to a collection of pus. His patient was a physician, aged thirty-two years, who suffered from a voluminous perinephritic abscess, as a sequel of a furuncle on the upper lip, three styes of the eyelids and a boil on the cheek. Albarran, one year later (1889), applied experimental injections of staphylococcus and colon bacillus cultures into the ear vein of rabbits, and by inflicting lumbar contusions in these animals succeeded in producing perirenal suppurations from which the injected pathogenic agent could be recovered. This observation established the fact that perinephritic abscesses can and do follow not only upon an infected wound of the perirenal region, but also upon a blood infection derived

from an organ situated at a distance from the kidney. The source of the infection may, accordingly, consist not only of a severe general disease but a distant and perhaps apparently insignificant focus is often responsible. In such cases perirenal localization of the germs is favored by more or less definite factors, such as traumatism or exposure.

Etiology. A distinction must be made between abscesses propagated to the kidney from other organs by continuity and abscesses of purely metastatic character which form in the renal cortex through embolic transportation of infectious agents in the renal arteries. These abscesses are usually due to the Staphylococcus aureus, as in my own observation, and often assume a relatively mild type; whereas acute streptococcal infections of the kidney, as pointed out by W. J. Mayo, are apt to be extremely malignant and are fortunately rare. Pus-producing bacteria which reach the kidney parenchyma by the hematogenous route are apt to lead to the formation of metastatic parenchymatous, perinephritic or paranephritic abscesses, and these may follow upon practically all suppurative or infectious processes in the entire body. Traumatism, in the form of a blow or kick, in the renal region sometimes acts as a determining factor in the localization of the lesions.

It is now understood that the pathogenic microörganisms which have penetrated into the blood current may pass through the kidney—which is the eliminating organ for microbes in the blood current—without giving rise to serious lesions of the kidneys themselves or the excretory passages and without apparently modifying the composition of the urine. Existing lesions of the renal cortex may be so trifling as to escape detection on superficial examination. The character of the pus in these infections naturally varies according to the character of the blood infection. The Staphylococcus aureus is usually found following upon boils and felons, while in other cases the streptococcus, the pneumococcus, the gonococcus, the colon bacillus or anaë-

robes may be demonstrable. The two latter are found more particularly in perinephritic suppurations following upon lesions of neighboring organs, such as the colon or duodenum.

The subject of metastatic hematogenous perinephritic abscess has recently been discussed by Cleisz (in a Paris thèsis, 1919), who reports 6 unpublished cases of staphylococcus aureus infection from the service of Lecene (1 of these cases was observed and operated upon before the war in 1913; the 5 others came under observation and treatment during the war): 4 patients gave a history of felons or boils, 1 had previously suffered from an attack of influenza and 1 from severe tonsillar angina with metastatic suppuration of the elbow.

It is important to keep in mind that metastatic perinephritis may be a sequel of practically all suppurative or infectious lesions of the entire body, notably boils and felons, but also general diseases such as typhoid fever, influenza, measles, smallpox, gonorrhea, peritonitis, empyema. The most important and perhaps the most frequent mode of origin of kidney suppuration accordingly is hematogenous infections in the form of metastatic parenchymatous or perinephritic abscess.

Symptoms and Diagnosis. The clinical picture of the disease was well described, several years ago, by Albarran, and no essential addition has since been offered in the literature. The onset is insidious and the behavior of the temperature is irregular. Pain, although the earliest and most constant symptom—often the only one during several days or weeks—is likewise very variable, and may be deep, dull and diffuse, or sharp and radiating in different directions according to the seat of the abscess. Deep pressure in the costolumbar angle usually elicits or aggravates the pain. Brewer has pointed out that a marked costovertebral tenderness is the one pathognomonic sign present in all cases. In advanced cases percussion with the patient in a suitable

position often yields absolute indefinitely outlined dulness. In the extrarenal infections, lumbar swelling is very important, and when fairly well marked may obliterate the costoiliac notch or even produce a visible lumbar protuberance. Edema of the skin is very important and constitutes a valuable sign which alone permits the differentiation of perinephritic abscess from intra-abdominal infection. Cutaneous reddening and fluctuation, which may make their appearance in abscesses with a tendency to point posteriorly toward the skin of the lumbar region, are late symptoms and should never be given time to develop.

A sudden attack of pain in the kidney region, especially when associated with fever, in an individual known to have a suppurative process somewhere in the body, should at once give rise to a suspicion of metastatic abscess in or about the kidney. The seat of the pain varies with the location of the focus and may be lumbar or abdominal. The patient's complaints are often misleading, so that the condition may be confused with gallstone disease or other abdominal affections, which, moreover, sometimes complicate the renal infection. The diseased kidney is not always indicated by the location of the pain, which has been known to occur on the healthy side, but the modified function of the affected organ will be indicated by the renal functional test, even if the cortical lesion is slight (Braasch).

Changes of the urine are usually inconsiderable and may be altogether absent. Serious alterations, pointing to an involvement of the kidney, have been noted only in exceptional cases. Microscopic hematuria, a few leukocytes, or traces of albumin, are occasionally found, and are sometimes temporarily demonstrable in the urine. When the urine is normal and there is nothing in the patient's history to draw attention to the kidney the diagnosis may prove very difficult, although much valuable information can often be obtained through cystoscopic and bacteriological examination, renal functional tests and radiography.

Differential Diagnosis. Urological evidence must be carefully secured, for it is only by the functional examination of the kidneys that the cause of the persistent fever can be traced to a destructive process in the kidney. A complete examination includes catheterization of the ureters, a report of the findings in the two separate urines, cystoscopy and ureteropyelography. In the carbuncle case described above cystoscopy and pyelogram proved the conclusive factor of assistance for the necessity of further surgical intervention. Pyelography is helpful in ascertaining the degree of renal destruction. In advanced cases the dilatation of the pelvis and calices may be so considerable as to assume the proportions of a pyonephrosis.

Cystoscopic and other urological methods of examination may be unsuccessful for the reason that the focus is closed off from the outside and does not communicate with the efferent urinary passages. Gross changes of the urine, indicating renal involvement are only exceptionally present.

In obscure cases exploratory exposure of the suspected kidney may be necessary. Incision of the abscess alone, without exposure and inspection of the organ, cannot be relied upon to reveal the actual condition of the kidney. Fever, sometimes chills, and slight tenderness on pressure may be the only symptoms until the peritoneum becomes involved, when another difficulty arises in the differentiation of the kidney lesion from the diseases of other organs in which the peritoneum is apt to participate. On the right side, which according to some observers is much more frequently affected than the left side, cholecystitis and appendicitis must be excluded. It is also necessary to exclude typhoid fever, malaria, general infections of undetermined character, as well as all conditions associated with backache of a diffuse bilateral type. The backache of perinephritic abscess is localized in the costolumbar angle. The formation of a swelling in the renal region may suggest some intrathoracic, pleural or pulmonary affection

or an abscess of the lumbar wall. Erroneous diagnosis of disease of the abdominal organs, notably the liver, gall-bladder, or appendix, must be carefully avoided. However, as pointed out by Braasch, coincident infection in the gall-bladder or appendix, as well as the kidney, is not infrequent. Tenderness on pressure below the twelfth rib, and sometimes considerable increase in the size of the kidney, are valuable signs pointing to the existence of an intrarenal abscess.

The differential diagnosis loses some of its difficulties when the possibility of perinephritic abscess is kept in mind, especially when the patient's previous history reveals the existence of a small suppurative process, notably a boil or a felon. A sudden onset of lumbar pain in these cases is supposed to correspond to the development of the cortical abscess.

The rendering of an early correct diagnosis is of the utmost importance, for surgical intervention is indicated. As stated by Keyes, perinephritic abscess should be diagnosed and drained as early as possible. Spontaneous absorption comes too late and is too uncertain.

Treatment. The treatment of these infected kidneys which have gone on to localized or generalized pus formation may be obtained by nephrotomy, resection of the kidney or nephrectomy. I agree with Keyes that it will frequently be wise to postpone nephrectomy until drainage shall have relieved the patient of his acute sepsis.

Resection has sometimes been followed by recovery, but the toxemia is apt to persist for several weeks after the operation, because septic foci have been left behind, so that extirpation of the entire diseased kidney is often preferable, especially in weakened patients. Nephrotomy, or resection, exposes to the disadvantages of slow healing and secondary hemorrhage; moreover, it is not free from the possibility of a persistent fistula. It enters into consideration, however, as a conservative procedure in those

cases where the infectious process is not widely distributed. The removal of the diseased organ prevents the distribution of the suppurative process in the body and protects against the involvement of the opposite kidney. In a general way, and on the basis of numerous considerations, nephrectomy is the simplest, most radical, and most promising procedure.

Conclusions. 1. That the kidney is the eliminating organ for circulating microbes, and in the course of this elimination may itself be damaged in a variety of ways.

2. Hematogenous infection may be restricted not only to a single kidney, but even to a circumscribed portion of the organ.

3. The source of the infection may not only be a general disease, but a distant and apparently insignificant focus may be responsible.

4. Metastatic hematogenous infection of the kidney, perinephritic or paranephritic abscess, is not always easily recognized, and may be confused with intra-abdominal infections.

5. A sudden attack of pain in the kidney region associated with fever, in a patient known to have a suppurative process elsewhere in the body, should excite suspicion of metastatic kidney infection.

6. Cystoscopy and pyelography are valuable aids, especially when urinary changes are incomplete or the symptoms are referred to the healthy side.

7. The treatment of perinephritic or paranephritic abscess is early drainage. Where the suppuration involves the kidney parenchyma, or where the process is an acute fulminating one, nephrectomy is indicated.

Bibliography

1. Albarran: Infections Renales, Traité de Chirurgie, Le Dentu Delbet, 1899, viii, 731.

2. Barth: Der Nierenkarbunkel. Archiv. f. klin. Chirurgie, 1920, cxiv, 477.

3. Bilhaut: Abscès périnéphritique consecutif a une plaie infectie de la jambe gauche, Annales de Chir. et d'Orthoped., 1910, xxiii, p. 2.

4. Braasch, W. F.: Perinephritic Abscess, Surg., Gynec. and Obst., 1915, xxi, 631.

5. Braasch, W. F.: Infections of the Renal Pelvis and Ureter, Texas State Jour. of Med. 1913–14, ix, 305.

6. Brewer, G. E.: Acute Unilateral Hematogenous Infection of the Kidney, Surg., Gynec. and Obst., 1908, vi, 699.

7. Cleisz, L.: Les Périnéphrites suppurées métastatiques, Thèse de Paris, 1919.

8. Israel, J.: Hämatogene Nierenabszesse, Chirurgische Klinik der Nierenkrankheiten, 1901, p. 34.

9. Keyes, E. L.: Perinephritis, Urology, 1917, p. 363.

10. Mayo, W. J.: Hematogenous Infection of the Kidney, Jour. Am. Med. Assn., 1919, dccxxxii, p. 1023.

11. Pedroli: Ricerche su alcuni casi di infezione renale ematogena, La Clinica Chirurgica, 1920, xxxvii, p. 388.

12. Verneuil: Des Abscès profonds et lointains consecutifs à l'anthrax, Comptes Rendus Acad. des Sciences, 1888, cvi, p. 112.

RECURRENCE OF THE BENIGN PROSTATE

By W. A. Bryan, M.D.
Nashville, Tenn.

The word "recurrence" is employed here with the same significance given to it when applied to malignant tumors, and with full conviction that it is a misnomer in both instances. The word carries the idea of complete cessation or disappearance or removal, and in neither instance is this true. In malignancy, recurrence signifies that the tumor is not entirely destroyed or removed, and that the unharmed vestiges continue their growth until the tumor mass reappears. It is the same with recurrent prostates. No tumor or prostate can recur after all the cellular structures of their respective masses have been destroyed. This was another way of saying that recurrence of either of these pathological conditions is unmistakable proof of their incomplete removal.

The word "benign" is employed to signify the clinically and microscopically benign prostate, excluding all hypertrophied prostates which show microscopic evidences of carcinoma in varying ratio, whose maximum is 14 per cent. There is too great a discrepancy between this maximum figure and the clinical course of prostates, operated and unoperated, for the surgeon to accept it as having valuable practical significance. Still, if there is microscopic evidence of malignancy, the recurrence might be accounted for on this score. Hence the establishment of benign recurrence must rest upon unquestionable cases. If these so-called

malignant prostates can be cured by prostatectomy, it would not be unreasonable to admit their recurrence just as that of benign growths, or, if one prefers, as growths showing the same inoffensive type of malignancy found in the original tumor, if indeed we are to admit that benign recurrence can take place.

Hypertrophy of the prostate is due to an overgrowth of connective tissue or of the glandular tissue or to an admixture of these two elements. The latter is the mixed form described by Kauffmann, and the enlargement of the gland may be universal or occupy only certain portions. This may be the right lobe or the left or middle lobe, or any two of them. When the hypertrophy is of the glandular or the mixed type, numerous centers of growth of individual nodules may be found, and numerous masses of varying size, from a guinea-hen's egg down to the limits of unaided vision. This can be easily demonstrated by the simple gross examination of a few removed prostates, and is occasionally an annoying feature of prostatectomy, necessitating the removal of the gland piecemeal. It readily appears, therefore, how easily one or more such smaller masses may be left *in situ* at operation. The investigation by Tandler and Zuckerkandl of this subject is of great interest, especially when we reflect upon the cocksureness with which we have led ourselves to believe that we were doing complete prostatectomies. These men have studied cases on whom "complete" prostatectomy had been done, and concluded that no complete prostatectomy was ever done, claiming that the "capsule," which operators so religiously refrain from disturbing, is not a capsule from the anatomic or histologic point of view, but is the prostate gland itself, or the remaining structurally normal portion of it which has been distended and compressed by the pathologic masses growing within it. Unless this work can be proven entirely untrustworthy, the wonder is that more recurrences are not discovered.

Etiology is of value in this connection and undoubtedly has direct bearing on recurrence. If the cause, whatever it may be, acts once and ceases to produce stimulative influence on the growth when it has acted, there should be no continuation of growth of unremoved fragments after prostatectomy. If the cause is continuous or repeated it may cause unremoved portions to hypertrophy after they have been left by the surgeon. Or if the cause acts unequally on the lobes, the stimulus on the less advanced lobes may continue to act after removal of the portions of the gland which had advanced far enough to produce symptoms. No doubt this enlargement of lesser remaining lobes may continue at a greater rate than had been possible before removal of the larger adjacent masses.

The failure of more numerous reports of recurrence rests, I believe, upon two causes:

1. That the patient who has had his prostate removed by a surgeon and has been relieved of his symptoms, and later finds those same symptoms returning, has a question raised in his mind as to the genuineness of the removal of the gland. He finally is compelled to consult his physician, who examines him and tells him that his prostate has never been removed, because it is still there, palpable and producing symptoms. This physician may be entirely honest; only a small percentage of the profession probably know of the fact of recurrence. The patient naturally feels unkindly toward the surgeon who claims to have removed a gland which is still present at its original site.

2. That when compulsion drives him, this patient is likely to seek relief at other hands. The second surgeon probably is human and feels perhaps that he is about the only man in the world capable of doing a prostatectomy. In other words, he is conceited. He also may prove uncharitable and think that the first operator removed only a portion of the gland, and concludes that the recurrence is simply the continued growth of gross portions left *in situ* through ignorance or neglect.

The treatment of such cases by two men consecutively robs both of them of the possibility of arriving at the truth, because neither is in position to compare the facts in his possession with the facts in the possession of the other. It is only when the primary condition and the recurrence are treated by the same man that the truth can be reached.

I have seen three cases of recurrence. One of these had been operated on by another surgeon, and came to me some years afterward on account of symptoms indicating recurrence. This was early in my career, and, not knowing the truth about such cases, I assured him most sanguinely that his prostate had not been removed. This case is no proof of recurrence. Perhaps my statement that it had not been removed was correct.

The second case was a recurrence of symptoms two years after the patient had been operated on by a most competent member of this Association, whose death occurred prior to the second operation. I do not believe he would have done an incomplete prostatectomy knowingly; still he might have left the right lobe on account of its small size or might have overlooked it. I removed it. It was benign. This case does not prove anything.

The third case I operated myself, removing the right and left lobes and the intermediate lobe. Microscopic examination proved it to be benign. This operation was done in November, 1915, and was what I considered to be a complete prostatectomy. The patient made a satisfactory recovery, and was relieved of his prostatic symptoms. He moved to another city, and began to develop obstructive symptoms again two years ago. Another surgeon was consulted, and the patient was informed that prostatic hypertrophy and stones were the cause of his distress. The stones were removed in April, 1920. At the end of the year 1920 his trouble returned, and the same surgeon operated again in January, 1921, finding that the passage was blocked by the continued enlargement of the prostate.

He assured the patient and his wife that there was absolutely no gross evidence of cancer. This surgeon was probably correct in refusing to do a radical operation on account of a bad heart and high blood-pressure, contenting himself with permanent suprapubic drainage. Some months ago the patient returned to Nashville. He presents evidence of a uniform enlargement of the prostate, just as if it had never been removed. The mass is easily as large as a tangerine and bears no clinical evidence of malignancy. The general condition of the man is good. His appearance and nutrition are good. He is annoyed by continued stone formation and by his cardiac symptoms. He does not give the impression of a cancer patient. This case, too, is not to be accepted as absolute proof that the recurrence is benign, but much more serious conclusions have been based on far less convincing circumstantial evidence.

It was admitted in the beginning of this discussion that there is no such thing as true recurrence of a removed pathologic tissue, and that recurrence in tumor or prostate is conclusive proof that some of the original tissues have escaped and subsequently grown to cognizable proportions. While it may be agreed that it is culpable to leave gross portions of a prostate, it must be admitted that there is weighty evidence that "complete" prostatectomies are not complete, and that there is unequivocal proof that benign recurrences have followed prostatectomy at the hands of very able men. The possibility of such an outcome imposes upon the surgeon the necessity of a little more thoroughness in this work, not with the hope of escaping recurrence altogether, but of cutting the percentage to a minimum.

URETERAL STRICTURE, AN IMPORTANT ETIOLOGICAL FACTOR IN THE SO-CALLED ESSENTIAL HEMATURIAS*

By Guy L. Hunner, M.D.
Baltimore, Md.

One of the most interesting problems in urology long recognized as belonging to the border zone between medicine and surgery is afforded by the so-called essential hematuria, occurring either with pain or colic or as a symptomless bleeding.

In the early days of scientific urological work, or in the last few years of the last century, hemorrhage from the kidney was supposed to indicate the presence of some gross lesion, usually tumor, tuberculosis, or calculus; but on more careful study of these cases it was found that renal hematuria not infrequently occurred in the absence of these conditions. When a policy of watchful waiting was adopted, not infrequently tumor or tuberculosis failed to develop and roentgenography was negative for stone, and when the more aggressive policy of exploratory operation was instituted none of these gross anatomical changes usually considered necessary for the production of a hematuria could be demonstrated. One of the early arguments in favor of the pain or hemorrhage, or both, being due to some obscure process without

* From the Gynecological Department of the Johns Hopkins University, Baltimore, Md.

anatomical changes, was the fact that these symptoms were often cured, at least temporarily, by any form of operative interference—by simple exploration, a decapsulation, or a nephrotomy.

These apparently negative findings then led to various theories concerning the hemophilic or vasomotor and nervous origin of these obscure hematurias, and in the attempt at a rational explanation of their etiology we have the development of such terms as Sabatier's "nephralgie hematurique" (1889), Schede's "essential hemophilia" (1889), Senator's "constitutional renal hemophilia" (1890), Harrison's "kidney glaucoma" (1896), Klemperer's "angioneurotic renal hemorrhage" (1897), and Casper's "nephritic colic due to spasms of the ureter."

For our present-day views on the subject we are largely indebted to James Israel. His monumental work, published in 1901, entitled *Surgical Clinic of the Kidney Diseases*, has long been a storehouse of knowledge for those interested in kidney surgery and pathology; and Chapter XIII, "Concerning Renal Hematurias, Nephralgias and Colics in Apparently Unaltered Kidneys," is a masterpiece, showing Israel's careful methods of history-taking, urinalysis, with clinical observation and notation at the bedside, in the operating room, and in the pathological laboratory.

This chapter is founded on an experience with 14 cases extending over a period of ten years, and these observations were made at a time when the refinements of surgery were making it a comparatively safe procedure to perform exploratory nephrotomy. Israel made such good use of these kidney autopsies *in vivo* that his accurate observations and sound deductions led to conclusions which were scarcely questioned in the ensuing twenty years. His chief conclusion was as follows: "The result of the analysis of my 14 cases of so-called *nephralgie hematurique*, essential and angioneurotic kidney bleeding, is that there can be shown in most

of them organic changes in the kidney or its capsule or an abnormal mobility."

Six years later Kretschmer[1] verified the viewpoint so clearly set forth by Israel by a careful microscopic study of autopsy or operative specimens from 61 cases of so-called essential hematuria and by finding in 52 cases positive nephritic or nephritic-like changes.

I shall mention at length just one other article from the vast literature that has grown up on this subject, that of H. Strauss, a co-worker of Israel in the Jewish Hospital of Berlin. His paper on "Congestive Pain and Congestive Hemorrhage of the Kidneys"[2] was presented in 1918 in honor of Israel's seventieth birthday. As indicated by the title, Strauss fully subscribed to Israel's view that kidney congestion is the immediate cause of the attacks of pain and the hemorrhages. He agrees with Israel that the hemorrhage is due to a lesion in some minute vessel and thinks the change from a "drip" or microscopic bleeding to a "massive" or macroscopic bleeding is due to an increase in the intrarenal pressure. "Although there may be others, the most frequent causes which bring on a temporary intrarenal increase of pressure are rigidity of the capsule wall and compression and strangulation processes at the renal pedicle."

The only point on which Strauss questions Israel's conclusions is the question of the frequency of monolateral nephritis. Kotzenberg[3] doubts its existence, and Kummel,[4] basing his opinion on the examination of numerous cases, more recently has claimed that with rare exceptions both kidneys are involved.

Strauss gives as his reason for writing on this subject a

[1] Ztschr. f. Urol., 1907, Bd. i.
[2] Berl. klin. Wchnschr., 1918, lv, 97.
[3] Ztschr. f. Urol., 1908, Bd. ii.
[4] Med. Klin., 1916, No. 35.

desire to report on the special points of view which have come to him and others from experience with the war nephritides. He reviews the recent literature, particularly that of the Germans, relating to the occurrence of pain and of abnormal elements in the urine, after severe exercise, fatigue, and exposure. These authors agree that they saw a larger proportion of renal pain (nephritis dolorosa) in the acute war nephritides than occur in civil life. He discusses at great length the meaning of the "residual erythruria" in which red blood corpuscles are found for months after all the other signs of a war nephritis have disappeared. He questions whether this condition belongs to well-marked orthostatic types or whether it is more or less a result of "fatigue congestion." He quotes Meyer[5] and Nassau[6] whose investigations during the war revealed a condition of "standing" albuminuria and hematuria. In soldiers who showed no albumin after lying down or after marching they found that after standing on guard duty or in the trenches for from one to one and a half hours about one-fourth showed albumin and casts; and in more than one-half of these (19 out of 35) there was an admixture of blood in the urine, sometimes only single red or white cells, whereas in others the quantity was so large as to suggest a hemorrhagic nephritis. Nassau examined 40 civilians ranging in age from eighteen to fifty years and after giving them the standing test found only 1 that gave positive reaction.

Jehle[7] has demonstrated albuminuria in children and youths after standing, and Meyer, Nassau, and Jehle all agree that these orthostatic manifestations in the urine follow a lumbar lordosis with compression of the inferior vena cava and consequent renal stasis.

Sonne[8] tested 11 cases of so-called orthostatic albuminuria

[5] Med. Klin., 1917, No. 17.
[6] Ztschr. f. klin. Med., 1917, Bd. lxxxiv, H. 1 and 2.
[7] München. med. Wchnschr., 1908, lv, 12.
[8] Hospitalstid, June 12, 1918, lxi, 800–817.

with bilateral catheterization and found in all that only the left kidney was involved in the albuminuria.[9]

Strauss always carefully examines the urine for erythrocytes. In 1200 patients who had no signs of nephritis, renal calculi, tuberculosis, tumor, or other diseases of the urinary passage nearly one-third showed periodically single erythrocytes. These positive findings pertained mostly to sufferers from heart or vascular lesions, and during or shortly after infectious disease, indicating the possibility of circulatory disturbances in the kidney.

It will be noted that the writers since Israel's contribution are agreed that these nephralgias and hematurias, formerly considered as occurring without demonstrable cause, have as a background a nephritis, either a focal or a diffuse interstitial nephritis or the parenchymatous form.

To explain the severe attacks of pain and the macroscopic hematurias they have followed Israel in ascribing these to heightened intrarenal pressure due either to rigidity of the capsule, some form of circulation stasis, some form of imflammatory congestion, or to a combination of all of these factors.

The object of this paper is to call attention to the important rôle that ureteral stricture probably plays in many of these cases. There has been abundant experimental and clinical evidence to show that a slow compression of the ureter often results in dilatation of the tract above the point of compression with greater or less damage to the kidney substance.

[9] The most satisfactory explanation yet offered for this phenomenon is to be found in the recent report of Rieser and Rieser (The Etiology of Orthostatic Albuminuria, Jour. Am. Med. Assn., March 4, 1922, 78, 644). They agree with Sonne that the albuminuria is of left-sided origin and explain this by anatomical data showing a pincers-like compression of the left renal vein as it crosses between the aorta and the superior mesenteric artery. They hope that future work will show whether the tug of the mesenteric artery in abdominal visceroptosis by itself can produce the albuminuria or whether the forward displacement of the aorta by a lordotic spine can produce it or whether it requires both morbid conditions acting together to cause the albuminuria.

My experience with ureteral stricture cases leaves no room for doubt as to the great importance of this lesion in the causation of hydronephrosis and secondarily of ptosis of the kidney. I also have abundant evidence that stricture instead of causing dilatation of the tract above may lead to shrinkage. This evidence consists in finding pelves which hold less fluid than normal either because of hypersensitiveness or because of actual shrinkage of the kidney due to nephritis. The evidences of nephritic changes are found in the urinalysis (in a few cases), in the reduction of function, by pyelograms, and by operation and pathological examination.

That the stasis due to stricture often leads to nephritic pain scarcely needs argument. The best evidence on this point is obtained from the fact that after dilatation of the stricture and the establishment of free drainage the pain generally disappears. In some cases, as I shall demonstrate with the lantern slides, the hydronephrosis and prolapse of the kidney, caused by the stricture in the lower ureter, lead to a secondary compression or kink of the upper ureter in the region of the kidney; so that the patient still suffers from these secondary conditions after the stricture has been well dilated. Such cases often call for an operation such as fixation of the kidney, partial resection of the pelvis, or the cutting of bands or aberrant vessels which have fixed the upper ureter and prevented it from prolapsing with the kidney.

Ureteral stricture is usually caused by an inflammation secondary to some distant focus of infection, and it is a well-recognized fact that nephritic inflammations (some of them accompanied by hematuria) are caused by focal infections. This being so, it might be argued that when in the nephralgias and hematurias under discussion a ureteral stricture is demonstrated the nephritis which causes the symptoms is due to the focal infection and not to the stricture.

The answer to this is that in many cases the pain and

hematuria cease promptly after dilatation of the stricture, and that when pain and hematuria return later investigation shows that the stricture has again contracted. Experience with stricture has shown that in many cases we treat repeatedly without a permanent cure until after we have found and removed an active focus of infection. Again, my Case XIV seems to demonstrate that the bleeding may persist because of repeated injury to the kidney due to some distant focal infection.[10] In this case the strictures were so well dilated that their presence could be demonstrated only by the use of a very large bulb, and yet the patient continued to bleed even after both kidneys had been split open. The patient has now ceased to show macroscopic blood for six months after removal of her tonsils. Whether she will bleed again remains to be seen.

Stricture has been demonstrated in 18 of my so-called essential hematuria cases. Three of these were former hematuria patients who have returned with bleeding in the past three years, and the other 15 are my last consecutive cases occurring in the past three years. I have recently been consulted about 3 cases of hematuria occurring in the male, 2 in the practice of Dr. George Walker and 1 under the care of Dr. William Neill. All three of these patients showed the presence of ureteral stricture by the wax bulb and the pyeloureterogram tests. Dr. Walker's two patients promptly ceased bleeding after dilatation and Dr. Neill's patient, a man aged fifty-six years, who had had hematuria continuously for nine years, improved markedly in weight and general health after three dilatations, but his bleeding persists moderately after four months.

In a careful analysis of Israel's 14 cases, from the case histories, physical examinations, findings at operation, and at autopsy, I am led to the conclusion that the morbidity in 11 of them was probably due to ureteral stricture.

[10] Emerson: The Acute Element in the Chronic Nephropathies, Jour. Am. Med. Assn., 1921, lxxvii, 745.

The 4 cases in his list which do not appeal to me as instances of stricture are Case I (201), which was probably a case of interstitial nephritis with heart and bloodvessel changes. Case II (202) Israel held to be a perinephritis secondary to a perityphlitis or recurring appendix abscess. The history on this case sounds much like one of stricture origin, but the pains totally disappeared after splitting of the kidney with its thickened fatty capsule. Case IV (204) was that of a woman, aged fifty-two years, with markedly movable kidneys and a history of good health up to four weeks before coming to the clinic, when she had acute left renal colic followed a few days later by massive hemorrhage which continued for twenty-one days.

Israel says that splitting of this kidney was followed by cure and demonstrated for the first time that simple nephrotomy might take the place of nephrectomy in such cases. I see many cases of floating kidney in which one of the etiological factors seems to be the increased weight of a hydronephrosis due to ureteral stricture. In this case there was apparently absence of hydronephrosis and the patient had had no complaints suggestive of stricture before her acute attack.

His Case XI (211) was that of a physician, aged forty years, whose symptoms of two hematuria attacks in four months with pain in the right upper flank, in the bladder, and in the right testicle are not at all uncommon with stricture; but operation in the case showed the right kidney to have an aberrant vessel to the lower pole, and the portion of the kidney supplied by this vessel showed distinct interstitial nephritis which Israel thinks may have been caused by an old hematogenous infection.

Israel reports 1 case, not in his list of 14 (Case LXV), to illustrate that "hydronephroses even of such small caliber that they entirely escape palpation may at times be the source of bleeding and colic." At his exploratory nephrotomy of the left side he passed a sound "down the

ureter to the bladder region but not into the bladder. Rectal palpation failed to demonstrate stone in this region." It seems fair to conclude that this was a case of mild hydronephrosis, together with hematuria and colic, in which Israel failed to grasp the significance of the obstruction in the lower ureter.

The limits of space forbid a critical analysis of the 11 cases, which I am inclined to believe were instances of ureteral stricture, but I shall here present the conclusions drawn by Isreal from the complete study of all his cases and shall comment on them from the viewpoint of an experience with about 1200 ureteral stricture cases.

It must be remembered that Israel was trying to drive home the significance of his discovery that these hitherto obscure cases of hemorrhage and colic were due to a nephritis. We are in entire accord with this main contention as well as with the following summary of his views which, though revolutionary in his day, have become common knowledge to those interested in kidney work today. Our comments on his conclusions are presented in order to establish a new viewpoint as to the etiology of the nephritis in a large proportion of these hitherto imperfectly understood cases:

1. "Nephritis may be monolateral." Of my first 100 cases[11] of stricture 30 were reported as bilateral and 70 as unilateral, 42 on the right and 28 on the left side. Since then in many of the supposedly monolateral cases the patients have returned with symptoms due to stricture on the opposite side. With more accurate knowledge I now find that in most patients suffering with stricture symptoms on one side one can easily demonstrate bilateral tenderness on palpation over the ureter at the pelvic brim and in the broad ligament region, and investigation with the wax bulb will demonstrate bilateral stricture.

If the nephritides under discussion are in large measure

[11] Ureteral Stricture, Report of 100 Cases, Johns Hopkins Hosp. Bull., 1918, xxix, 1.

dependent on ureteral stricture we are obliged to side with the views of Strauss, Kotzenberg and Kummel, quoted above, that Isreal greatly overestimated the frequency of monolateral nephritis.

2. "Nephritis may be accompanied by attacks of pain which closely resemble those of renal colics due to obstruction to the outflow." As seen above, Israel and subsequent observers, including Strauss, have ascribed these attacks to a renal congestion due to an unusually dense capsule plus some cause of heightened intrarenal blood-pressure, or to a congestion following the kinking of an abnormally mobile renal pedicle.

That an end can be put to such colics by the simple means of giving the kidney pelvis good drainage through the dilatation of a narrowed area in the ureter would seem to be sufficient argument that the symptoms in many of these cases are due primarily not to the intrinsic kidney changes or to the abnormal mobility of the kidney, but to an actual hindrance to the outflow of urine.

3. "In purely unilateral pains and colic bilateral nephritis of equal severity may be found." We have seen in the section above that, if we limit our investigations for stricture to the side subject to symptoms, we shall find an apparent monolateral involvement in about two-thirds of the cases, whereas if we make a more careful physical examination we shall find bilateral ureteral tenderness in nearly all of these cases, and the wax-bulb test will show the presence of stricture on both sides.

One of the most striking facts which I have demonstrated repeatedly is that a patient may have complained for months or years with symptoms due to stricture on one side and may have had no pain or symptoms on the other side, and yet investigation shows that the supposedly good side has suffered far more damage from stricture. The side to which the symptoms are referred may show little or no dilatation of the kidney pelvis, while the supposedly healthy side may

have a distinct hydronephrosis with a decidedly lower phthalein output than the other.

4. "In nephritis, radiation of the pains may extend to the bladder and urethra." In a study of 100 consecutive cases of ureteral stricture to determine the incidence of bladder symptoms I found that 71 of the patients complained of this symptom. In 33 of these the bladder disturbances were a marked and more or less constant feature of their complaint, and in the 38 patients classified as having mild bladder symptoms many had rather severe bladder symptoms during their attacks of renal pain due to partial or complete closure of the stricture area.[12]

As will be found by a study of the paper just referred to, it is often difficult to decide just which portion of the urinary tract is causing the major part of the bladder symptoms. In some cases of ureteral stricture with intense bladder symptoms, even leading to incontinence, we can find absolutely no other lesion to account for the symptoms and the treatment of the stricture clears them up. In others we find an associated cystitis, trigonitis, or urethritis probably provocative of some of the symptoms.

5. "In advanced nephritis albumin and casts may be constantly absent from the urine." In stricture work we find repeated evidence that a prolonged interference with the urinary outflow may lead to a severe grade of interstitial nephritis, and yet the urine may appear quite normal on repeated examinations.

With an anamnesis and palpatory signs suggesting the presence of stricture one feels rather more certain of the diagnosis if slight albumin, a few casts, or a few leukocytes or erythrocytes are found in the urine; but the absence of these pathological elements should not deter us from a further investigation of the urinary tract, as has happened too often in the past. In the 100 consecutive cases just

[12] Hunner: Intractable Bladder Symptoms Due to Ureteritis, Jour. of Urol., 1920, iv, 503.

mentioned the catheterized bladder urine was normal in 28 cases and in centrifuged specimens showed leukocytes in 55, erythrocytes in 17, and casts in 4. Albumin was found in 26 and cultures were positive in 18 cases. Cystitis was diagnosticated in 6 cases and ulcer of the bladder in 4, while a mild trigonitis was found in 47 cases and an intense trigonitis in 11 cases. Infiltration of the urethra, either local or general, was noted in 85 cases, but of course this lesion would not influence the catheterized urine.

6. "The urine may show many hyaline, granular, and epithelial casts and still remain albumin-free."

7. "There are cases of nephritis with intermittent or continuous massive hemorrhages which from the standpoint of their volume and duration, the capriciousness of occurrence, or the limitation to only one voiding cannot be differentiated from the hematurias of malignant tumors.

"Nephritic hemorrhages can occur and continue with or without colics. Bleeding is never the cause of colic. Both symptoms are the result of the kidney congestion."

In this report on 18 cases of so-called essential hematuria occurring in the past three years we have included only those cases showing more or less continuous hemorrhage or those with hematuria showing a persistent tendency to recur.

We have not included many cases with slight hematuria or cases with acute profuse hematuria and severe colic, suggesting the passage of a stone, in which the discovery and treatment of a stricture has promptly relieved the symptoms.

We take issue with Israel's statement that the hemorrhage is never the cause of the colic, having seen cases in which the passage of a ureteral clot has been followed at once by relief of the kidney colic.

Extra precautions are taken in treating a stricture in a patient who has but one kidney, for if the stricture area is overtraumatized there may follow clot blockage of the

stricture area and complete anuria until the clot is passed. One such case had anuria four days, with every evidence of complete renal blockage until a long ureteral clot was passed, when the serious symptoms began to clear up at once.

8. "A large number of the cases hitherto designated as nephralgia, nephralgie hematurique, and angioneurotic renal hemorrhage are due to nephritic processes." We may add that these nephritic processes are often the result of ureteral stricture.

9. "In many cases the symptoms of the disease are favorably influenced by incision of the kidney." Every surgeon of experience with these cases will agree with Israel on this point. It is a common experience also that not a few of these cases, perhaps 50 per cent of them, again have bleeding and a larger percentage again develop pain. Israel's final summary of his own results is as follows: Of 14 cases 3 died, 2 of these with severe bilateral nephritis. Of the 11 living 6 have remained well; 3 after apparent recovery for varied intervals had return of their symptoms, but with lessened intensity and with longer intermission, and in 2 cases the operation seemed to relieve for only a short time.

It is difficult to form a logical explanation for certain phenomena that have been observed in the handling of these hematuria cases. Many have been reported cured by simple catheterization of the kidney. Others have ceased bleeding after an instillation with adrenalin, or the taking of a pyelogram, or after lavage with silver nitrate. It is possible that the passage of the plain catheter has given enough ureteral dilatation to alter the condition in these cases. Some cases have ceased bleeding under the excitement of entering the hospital or having a simple cystoscopy of the bladder. Apparently it requires very little alteration of the circulatory conditions to effect at least a temporary cure in some cases.

One can easily conceive how a nephrotomy, decapsulation, renal fixation, or the mere delivery and examination of a bleeding kidney might so alter the vascular conditions that one or more bleeding-points would heal, but it is more difficult to explain why these measures should give relief to nephralgia in any considerable proportion of cases if the pain is dependent on urinary stasis from a stricture. We have already emphasized the fact that we see some patients complaining of unilateral kidney and ureteral symptoms in whom we demonstrate bilateral stricture and a hydronephrosis or other kidney changes on the symptomless side. This would appear to indicate that symptoms when present are not necessarily due to the urinary stasis *per se* but may arise from some secondary nephritic changes. The operation may influence such secondary changes in a manner to cause cessation of pain even when the stricture with its stasis persists. I have emphasized above the fact that the static dilatation of the pelvis may lead to secondary kinks or compressions of the ureter in the kidney region, and it is quite possible that some of the cases relieved by nephrotomy, decapsulation, or fixation are relieved because of the better fixation of the kidney and the consequent improved drainage of the upper ureter obtained through these operations.

While we may accept Israel's ninth conclusion, above quoted, my experience with ureteral stricture warrants the statement that we arrive at better results without operation if we pay proper attention to the ureteral stricture involved in most of these hitherto obscure cases of nephralgia and hematuria.

10. "The kidney wound should not be closed by suture." It is significant that Israel found by experience that these patients did better by establishing direct kidney drainage. This is what we would expect if their kidney condition was due to an obstruction in the lower ureter. It is probably this same stricture obstruction that occasionally surprises

and disappoints the surgeon when after a pyelotomy for stone or a nephrotomy for infection he expects prompt healing and gets a prolonged urinary fistula.

It is not within the scope of this paper to enter a discussion of the causes and differential diagnosis of renal hemorrhage. We have taken the stand, however, that renal exploratory operations for the determination of the cause of hemorrhage should be far less frequent in the future than in the past. For fear that such teaching might lead to a costly delay in some patient whose hemorrhage comes from a tumor of the kidney I wish to emphasize that in any renal bleeding, particularly in a case of symptomless renal hematuria, one should assume the duty of proving that the bleeding does not come from a malignant tumor. Fortunately we have the methods of precision that enable us to determine the source of bleeding in most cases without resort to exploratory operation.

We see an occasional case of acute renal hematuria in which the bleeding is so profuse and the patient has become so depleted that prolonged investigation seems to be out of the question. If simple cystoscopy demonstrates that the hemorrhage is confined to one side our better judgment may dictate an immediate exploration as a life-saving measure.

In the usual case we should not hesitate to explore a bleeding kidney without delay if a reasonable attempt at diagnosis has been futile and if the bleeding fails to respond to the treatment above suggested for cases of supposed idiopathic hematuria. Too often in the past we have seen patients who have been advised by their physicians to pay no attention to urinary blood because it was unaccompanied by pain or other serious symptoms. Happily the profession is now alive to the possible meaning of hematuria, and the laity has been so well reached by the popular diffusion of knowledge concerning cancer that we are seeing patients with cancer of the bladder and malignant tumors of the

kidney in the early stages when fulgeration, radiation, and operation are not infrequently followed by cure.

In spite of the perfection of methods of radiography and pyelography we will occasionally miss a small or an early hypernephroma or other malignant tumor of the kidney which can be demonstrated only by operation. Exploratory incision is the only means we now have of demonstrating the early papillomas of the kidney pelvis, and the cases of persistant bleeding due to renal varix, and those due to aneurysm of the renal vessels. These conditions are all rare and the chief benefits of exploration will come from finding early malignant tumors escaping other methods of diagnosis.

Ureteral stricture is such a common lesion that one must constantly be on guard for the possible synchronous presence of stricture and some other lesion which may cause hemorrhage. I have diagnosed 1 case of ureteral stricture and caused complete temporary relief of symptoms by the first ureteral dilatation, and ten months later, on return of the patient's symptoms of pain in the right kidney region and microscopic blood in the urine, renal calculus was demonstrated by the roentgen ray. In 2 cases treated for stricture without pyelogram examination hypernephroma was demonstrated later; 1 of these never showed blood in the urine, while in the other case it was the later development of active renal bleeding which led to pyelography and the discovery of kidney tumor.

If the following case histories and pyelograms with their legends lead to the investigation for stricture in all cases of so-called idiopathic hematuria I am sure there will be a great reduction in the shocking record one finds in the literature of nephrectomies done for bleeding "without sufficient findings." There will also be a great decrease in the exploratory operations and the nephrotomies, nephropexies, and decapsulations as therapeutic measures, for

many of the patients will cease bleeding after dilatation of the stricture.

The importance of clearing up possible foci of reinfection has been demonstrated so often in dealing with refractory ureteral strictures that we wish to emphasize again the wisdom of taking up the focal infection problem in making our early investigations of any obscure hematuria case, particularly if ureteral stricture is demonstrated.

The great tendency to recurrence is a characteristic well recognized by all those familiar with these so-called essential hematuria cases. Whether this recurrence of hemorrhage after apparent cure is due to a recurrence of kidney injury due to back pressure from a stricture area which has again narrowed, or whether it is due to a fresh injury to the kidney substance by blood-borne toxic material from a distant focus, the importance of eliminating such possible foci is apparent.

I realize that I am laying myself open to criticism by strict constructionists who would confine their classification of essential hematuria to those cases in which there is no urinary tract symptom other than hematuria and no pathological finding in the urine but blood, and who require that the functional test be equal and normal and the pyeloureterogram negative. It is likely that, in the past, in many cases which have been reported as instances of essential hematuria there has been lacking the careful attention to bladder symptoms now known to be so important in a study of ureteral conditions, and that these patients have not had the advantage of all the methods of investigation which are commonly employed today. As a matter of history Israel's classical cases and later Kretschmer's work showed that a nephritis is one of the chief lesions associated with these cases of hematuria.

I have already indicated my exclusion of the many cases of ureteral stricture accompanied by a few erythrocytes in the urine, and the cases with sudden acute onset of severe

colic and bleeding suggesting the presence of ureteral calculus, or of kidney stone, tuberculosis or tumor, and in which investigation reveals stricture, and treatment soon causes cessation of the symptoms.

I have purposely presented rather full histories to show that my 18 cases correspond to those commonly reported in the past as instances of idiopathic or essential hematuria. Many of them have been so reported without a careful investigation of the bacteriological, chemical, functional, and roentgen-ray evidence. In some of them the pyelograms have been misinterpreted, and in none, so far as I know, was a ureteral stricture looked for. In all of my cases the serious symptom requiring careful investigation was the bleeding. In 10 of my cases this symptom had been present less than one year and in the other 8 cases the duration of the bleeding had ranged from one to twenty years, with an average of six and one-half years.

I am willing to go along with the strict constructionists in excluding from the former classification of essential hematuria those bleeding cases associated with hydronephrosis, pyelitis, or nephritis with reduced function, but not on the implied grounds that in such cases the hematuria is due to the associated pathological lesion. Evidence is accumulating, as shown by this and by former publications, to indicate that such lesions are usually due to ureteral stricture, and that in the few cases of pure hematuria in which we cannot demonstrate an associated kidney lesion by our diagnostic methods, the presence of ureteral stricture will usually be demonstrable.

In other words, I am asking the strict constructionists to go a step further and see if we cannot practically eliminate such clinical terms as "*nephralgie hematurique*" and "*essential hematuria*" by finding the pathological cause or causes on which these conditions depend.

After going over a series of cases such as are here presented one of course cannot feel that we have discovered any one

satisfactory all-embracing explanation for the phenomenon of bleeding. I am confident, however, that in the future we shall find most of these cases associated with ureteral stricture; but just what share the stricture may have in causing the nephritic lesions resulting in the bleeding, and what share distant focal infections may have by direct action on the kidney tissues, and what other factors may be contributory, are problems offering tempting opportunities for future investigations.

In earlier publications I mentioned the fact that erythrocytes are found in a fairly large number (approximately 20 per cent) of stricture cases and suggested that they probably come from an ulcer in the stricture area in some of these cases, and in some, where considerable blood is found after an acute renal crisis, it probably comes from injury to the kidney substance due to back pressure.[13]

Seven of my 18 patients had bilateral hematuria, and bilateral stricture was demonstrated in all of these except in Case X, in which the patient would not allow investigation of the other side. Four patients had pain on the nonbleeding side and were found to have bilateral stricture. Six were tested for stricture on the bleeding side only. One patient had no hematuria while under our care. She had had one kidney removed in New York because of hematuria "of unknown origin" and came to me because of chronic backache of many years' duration and a severe pain in the left kidney region of two months' duration. These symptoms disappeared after three dilatations of a left ureteral stricture, and she gained twenty pounds in weight.

Hydronephrosis Associated with Hematuria. Of the 26 kidneys tested for the pelvic content 13 had a capacity of 12 cc or more, and 11 of these were bleeding kidneys with an average measured pelvic capacity of 41 cc.

[13] Hunner: Ureteral Stricture, Report of 100 Cases, Johns Hopkins Hosp. Bull., 1918, xxix, 1, and The Etiology of Ureteral Calculus, Surg., Gynec. and Obst., 1918, xxvii, 252.

Pyelitis Associated with Hematuria. In 6 of the 25 cases of bleeding kidney (7 of the 18 patients having bilateral hematuria) an infection was present, the bleeding and pyelitis being bilateral in 2 of the patients. In 4 cases there was hematuria on one side without infection and pyelitis on the opposite side, making 10 infected kidneys in the 18 patients. Ten of the patients had sterile bladder urine.

Symptomless Hematuria. In only 4 patients was there complete absence of kidney pain and of bladder symptoms. Bladder symptoms were present in 8 cases and absent in 10 cases. Of the 25 bleeding kidneys 15 had pain.

Results of Treatment on the Hematuria. In Case X after eight months of constant hematuria the patient refused treatments after the first investigation and dilatation of the stricture on her most hemorrhagic side with a 4 mm. bulb. This one dilatation seemed to bring about a marked improvement for two months. In Case VIII the bleeding kidney had been removed and the patient came merely for symptoms due to stricture on the other side.

This leaves 16 cases in which we have had a good opportunity of testing the value of ureteral dilatation in handling these obscure hematurias. Of these 16 cases, in 1 (Case XIV), recurrences occurred after dilatation of the bilateral strictures and even after bilateral nephrotomy. After her second nephrotomy (left) she had a recurrence of bleeding at the end of four and a half months. Her bad tonsils were then removed and after two weeks she ceased bleeding and saw no further blood for six months, but on her return, at our request, there was found microscopic blood. She probably still had some pyelitis following slow healing of her pyelotomy wound and this may have accounted for the microscopic blood.

In case II a nephrotomy was performed at a time when we were not looking for stricture. The patient had no further bleeding but when she, four years later, returned with acute pyelitis on the opposite side we demonstrated bilateral strict-

ure. In none of the other 14 cases was a kidney operation performed. Of these 14 patients treated only by cystoscopic methods and care of focal infections 5 have shown recurrences of the bleeding. It is quite possible that all 5 of these still have a focus of infection. Of these, in Case I a tonsillectomy was performed, but the patient still has a considerable amount of tonsil tissue and is troubled with sore-throat and bronchial cough. She has only slight recurrences of bleeding and is in excellent general health considering her marked kidney lesions.

Case III was one of our early patients whose history contains no note on a tonsil examination, but states that "catching cold" seems to bring on the bleeding. Her ureteral dilatations always seemed to ameliorate the bleeding, but she had a marked recurrence while pregnant one year after her last treatment and is again bleeding after an interval of freedom for two years following her childbirth. In Case IV the patient seems to have started with rheumatism and hematuria many years ago, when she had bad teeth. After complete extraction of the teeth the arthritis ceased, but she has continued to return intermittently for ureteral dilatations since 1913. One dilatation seems to result in a cessation of macroscopic bleeding for several months. In Case VII the patient, after showing blood in the urine for perhaps six or seven years, was seen intermittently over a period of three years for attacks of severe hemorrhage. The ureteral dilatations were always followed promptly by cessation of bleeding, but her recurrences threatening her life did not abate until several abscessed teeth had been extracted. She has not been seen for eighteen months, but still has mild recurrences. One patient (Case XVI) when last heard from over one year after the last of her five ureteral treatments was still having slight bleeding at times, although her general health was decidedly improved. She had not had some suspicious-looking teeth investigated.

So far as I know 10 patients have been free from hematuria

for periods varying from eighteen months to seven years, one of these (Case II) having had a nephrotomy and 9 of them cystoscopic methods only. Most of these cases cleared up promptly after ureteral dilatation and in some of them there was absolutely no other treatment than the wax-bulb dilatation until after the cessation of bleeding. In other words, after discovering the association of stricture with these hematuria cases I made it a practice to defer measuring the pelvis, irrigating, and taking roentgen rays until the patient had ceased bleeding, so that we might have a good test of the therapeutic value of the one method of dilatation and good kidney drainage.

Our cases are too few in number to warrant dogmatic conclusions, but the results suggest that ureteral dilatation and care of focal infections will be the future treatment for most of the so-called essential hematurias.

Case I (Fig. 1).—Mrs. K., aged thirty-six years, referred by Dr. Christian Midelfart, of Eau Claire, Wis., March 8, 1920, because of intermittent hematuria. The first bleeding occurred about November 1, 1919. After several days of hematuria the patient was sent to the hospital for investigation. The day she entered the hospital, and before instrumentation, the bleeding ceased and did not reappear during a ten days' stay in the hospital. Dr. Midelfart found a normal-appearing bladder and a negative plain roentgen-ray picture of the urinary tract. He was unable to catheterize either ureter. About six weeks later the patient had a five-day period of hematuria, and bloody urine was again seen on her trip to Baltimore.

This patient was first sent to me in 1910 by Drs. Lyman and Derge, because of intermittent attacks of pain in the left kidney region for a period of six years. More recently these attacks were accompanied by nausea and vomiting, and urine containing pus, blood, albumin, and bacteria. The first attack began at about twenty years of age, soon after the patient had pneumonia followed by tonsillitis and rheumatism. So far as I know this is the first case reported of ureteral stricture due to focal infection.[14]

[14] Hunner: Chronic Urethritis and Chronic Ureteritis Caused by Tonsillitis, Jour. Am. Med. Assn., 1911, lvi, 937. Case 7 in that report refers to the patient and carries her history up to the time of that report made in December, 1910.

We had been unable to catheterize either ureter and on November 26 I performed extraperitoneal retrograde dilatation of the left ureter, finding a dense, diffuse thickening of the broad ligament portion and dilating up to 7 mm. (21 Fr.).

The patient did well while quiet in the hospital, but as soon as she got out and became active she again developed attacks of pain, each lasting two or three days and accompanied by nausea, vomiting, and fever.

On January 10, 1911, I operated again, intending to implant the left ureter above the stricture area into the bladder, but the patient's condition was not good, it was difficult to locate the ureter in the recent operation site, and when the supposed ureter was found it was tied off with linen and cut in two with the intention of causing obliteration of the kidney function. Subsequent events have proven that we attacked some other structure than the ureter, probably the obliterated hypogastric.

The patient returned home in fairly good condition, got married two years later, and in 1915 gave birth to a boy by accouchement forcé at the end of eight months. She had uterine pains and threatened abortion several times during pregnancy.

Until her second visit, in 1920, because of hematuria, the patient had enjoyed reasonably good health but always had to be careful not to overexert or get overtired because of the attacks of pain in the left kidney region. She had some pain in both broad ligament regions and some bladder frequency and distress, especially in association with her recurrent kidney attacks.

On her return, in 1920, I was able to get through the stricture areas on both sides and found the left kidney held 100 cc and the right 28 cc. The left kidney urine had a colon bacillus infection while the right was sterile. The intravenous phthalein injection, on May 11, resulted in one-half hour: Right kidney, 138 cc, 43 per cent; left kidney 15 cc, 0.6 per cent. On June 18, after both sides had been well dilated, the right side showed 40 per cent against 7 per cent on the left.

I saw the patient at her home in June, 1921. In the year since her ureteral dilatations her general health had been better than for years. She still had mild attacks of pain in the left kidney region about monthly, usually after her menstrual periods or after getting her feet wet. While her tonsils were removed on her first visit in 1910 she still had considerable irritation of the throat, together with cough, and at such times her bladder frequency and

pain in the side were exaggerated. She had had two spells of hematuria in the year, each lasting three or four days. There was considerable red inflamed-looking adenoid tissue in her tonsil spaces, which her surgeon was advised to clean up with the actual cautery.

Case II.—Miss M., aged thirty years, referred by Dr. L. F. Barker, December 18, 1914, because of an acute attack of cramp colic in the left kidney region and bloody urine. The attack began with "indigestion" lasting one day, and the following day at 3 A.M. the patient was awakened with severe cramp colics in the region of the left kidney, extending down the flank to the bladder. The patient spent the forenoon sitting on the toilet trying to void. Three tablets of $\frac{1}{4}$-gr. morphin during the day had helped relieve the pain when I saw her at 4 P.M. The left kidney was just palpable over the lower pole and was very tender. She was tender along the abdominal ureter and palpation of the kidney or ureter caused a desire to void.

A specimen of urine catheterized from the bladder was dark red and showed microscopically many erythrocytes, an occasional leukocyte (blood), a few epithelial cells, a few hyaline and granular casts, and the HNO_3 test for albumin showed a 2 mm. ring. The next day at the hospital I found the bladder normal, the left ureteral orifice somewhat congested looking, and the wax-tipped catheter passed to the left kidney without appreciable obstruction and without getting scratch marks. The urines from the bladder and left kidney were negative to culture.

Silver iodide roentgen rays on two occasions were both poor plates, but Dr. Baetjer thought there was "a suggestion of flattening of the kidney pelvis." The kidney took about 10 cc to the point of discomfort.

Failing to make a positive diagnosis the patient was dismissed, but she was kept under observation, and when seen on five occasions in the next six weeks she still had some pain and soreness in the left kidney region and usually had microscopic blood and slight albumin in the urine.

Fearing a beginning kidney tumor I did an exploratory nephrotomy on February 17, 1915, with negative findings. We then made a diagnosis of acute monolateral nephritis with hemorrhage.

I saw the patient twelve times in the next two years and she continued to have some pain in the left kidney region, particularly

at the menstrual period, and if she overworked she developed nausea at times and at times diarrhea. Soon after the operation the urine became free from blood and albumin. At times the patient complained of some pain and tenderness in the right kidney region.

Dr. Cullen saw the patient in November, 1917, when a note was made that she had tenderness in the upper right abdominal quadrant. Some days later Dr. Follis operated for chronic appendicitis on her somewhat obscure history of much gastrointestinal disturbance, nausea, and vomiting, and pain in the right lumbar region. The appendix was described as long and slender and containing gas. Roentgen rays had suggested duodenal ulcer, but there was no operation note as to whether this was investigated.

In November, 1918, Dr. Sidney Miller phoned me that he had just sent the patient to the hospital with an acute attack of pain in the upper right quadrant, where a mass could be felt, and that she had a high fever and pus in the urine.

My more recent work on ureteral stricture then enabled me to give him the probable diagnosis over the phone. I recalled our unsatisfactory diagnostic experience with her left renal colics and hematuria and the later vague abdominal pains and gastrointestinal disturbances, and predicted that the explanation for these phenomena as well as for her present acute pyelitis on the right side would be found in the demonstration of bilateral ureteral stricture.

Examination with the wax-bulb catheter demonstrated two stricture areas in the right ureter with a colon bacillus pyelitis and one stricture area in the left ureter with normal urine.

The pyelitis quickly subsided after the one dilatation and six weeks later, on January 10, 1919, I dilated the right side a second time with a 5.3 mm. bulb, finding normal urine.

On October 28, 1919, the patient wrote from London, England, asking for instructions for her physician because her old pains were returning. Presumably she had not noticed hematuria again.

Case III.—Mrs. C., aged twenty-seven years, referred April 10, 1916, by Dr. William M. Dabney. When a child twelve or thirteen years of age she had much backache and for several weeks there were intermittent attacks of terrible pain in the bladder just after voiding and the passage of a few drops of blood. When pregnant at eighteen years of age she had blood in the urine. Three years ago she had blood in the urine before an appendix opera-

tion and roentgen ray showed "a spot in the left kidney." The surgeon removed the appendix through a midline incision and palpated the left kidney and "found a dislocated rib." Blood was present after the appendix operation. Hematuria was present for one or two days one year ago. In the past month has had hematuria three times. With the first of these attacks she thought she had pleurisy, and there was tenderness across the epigastrium. The last attack was three days ago, and she thought she was going to have kidney colic. Not much pain, but much gas and flatulence and an irritable bladder. The hematuria usually lasts about two days and the urine is sometimes bright red and sometimes black. "Catching cold" seems to bring on the bleeding, and she gets irritable and depressed and has a dreadful occipital headache with the hematuria attacks. Usually she has no bladder symptoms.

Examination. Left kidney not palpated. Right kidney just palpated lower pole and quite tender. Ureter pelvic brim regions tender and pressure causes nausea and desire to void. Tenderness and desire to void on palpation of both ureters in the broad ligament region. Catheterized bladder urine dark red with blood; a few pus cells; many bacteria; albumin corresponding with blood; no casts.

Urethra infiltrated; bladder normal; trigonum reddened; left ureteral orifice pin-point; right orifice normal. Left side catheterized with No. 8 renal with wax tip and small wax rings at 5 cm. intervals to detect and locate ureteral stone if present. No scratch marks; "one or two of the wax rings *held* a little on being withdrawn." Urine from left kidney shows no more erythrocytes than expected from trauma. Two weeks later the patient reported having seen no more blood and having no special symptoms. The right kidney was catheterized with the wax-tipped catheter with negative results. On May 16 the bilateral thorium roentgen ray was taken. Although a poor plate it showed the kidney pelves rather smaller than normal but the ureters somewhat dilated. A diagnosis was made of "idiopathic hematuria."

The patient returned two years later, in May, 1918. She had one hematuria spell about one month after her first visit and has had five or six spells in all. There has been more or less pain all the time and she had had several attacks in the left hypochondrium rather high and far anterior for a kidney pain, but her doctor thought these might be stone attacks. The hematuria has usually followed these attacks but has sometimes been independent of the pain. About a month ago the patient had the worst attack she ever had,

and thought she was getting lumbago because the pain was lower than her kidneys. For four days she had morphin by mouth every three hours, and was much nauseated. Her physicians could not determine the nature of her attack until the day after she got out of bed, when the urine contained much blood, and it was decided that she had a stone attack.

In the intervening two years I had been making investigations on ureteral stricture, and on referring to the notes on her first visit and finding that the small wax rings had shown a "hang" on withdrawal, and the roentgen ray had shown dilated ureters, the diagnosis was almost certain.

On investigation with the wax bulbs, wax tips, and roentgen ray there was no evidence of stone in the urinary tract, but there were two strictures in the lower end of the left ureter. The left side was treated May 28, June 7, and July 30, 1918, and she had no more bleeding until December 1 when blood was seen in one voiding only.

The patient returned in February, 1919, with the history of having had influenza in January with fever for three weeks. She was confined to bed for two weeks with a temperature of 103° when first ill, and at the end of two weeks the temperature was normal in the morning and 101° in the evening. At this time she had a hematuria lasting three days. A week later she had an abscessed tooth and much pain in the back, called "lumbago," and two days of hematuria. After extraction of the tooth the temperature became normal and her "lumbago" pains subsided. She states that she does not have pain while the hematuria is on—she seems to have increased pain for about twelve hours before the bleeding begins. This feels to her like intestinal cramps. She has a burning pain low in the left abdomen most of the time, but this is not severe and gives her but little trouble. On examination the patient had some general abdominal tenderness, considerable soreness on pressure over both ureteral pelvic brim regions, with much tenderness and desire to void on pressure over the ureters in the broad-ligament regions. The bladder urine showed a moderate number of leukocytes and erythrocytes and yielded a colon bacillus culture. Between February 25 and June 24 the left side was dilated twice and the right side three times, carrying the bulbs up to 5 mm. The left side showed two stricture areas, a very slight hydronephrosis, leukocytes, and a colon bacillus culture. The right side showed one stricture area and leukocytes in sufficient number to indicate a pyelitis in spite of a negative culture. The patient was impressed

with the necessity of returning for treatment in case of further bleeding, and she has not been heard from since June, 1919.[15]

Case IV (Fig. 2).—Mrs. H., aged fifty-eight years, admitted to the Johns Hopkins Hospital, August 25, 1913, complaining of symptomless hematuria of twenty years' duration. This began after a childbirth and there have been intervals as long as one year without macroscopic blood in the urine. Her general health has been excellent. There has been some backache in the lumbar region, usually appearing in the morning and wearing away during the day. Both kidneys were catheterized with plain catheters and the urine showed macroscopic blood, no leukocytes, a urea output from each side of 10 grams per liter. Fifteen years before admission the patient had arthritis, which was attributed to oral sepsis, and was improved by the extraction of all her teeth. Diagnosis: Bilateral symptomless hematuria. The patient was readmitted to the hospital in 1920 and gave the history of freedom from hematuria for two years after her first admission, but with almost constant bleeding since 1915. At this time the blood was coming from the right side only and the wax-bulb test and pyelogram showed the presence of right ureteral stricture with rather marked dilatation of the ureter and pelvis, the content being 25 cc. Hemoglobin, 62 per cent. For the past two years the patient has visited the dispensary clinic every few months, one dilatation of the stricture being sufficient to give her comparative freedom from bleeding for several months.

Case V.—Mrs. J., aged sixty-nine years, referred in May, 1917, by Dr. Hardee Johnston, of Birmingham, Ala. Within six weeks the patient had four attacks of profuse hematuria, each attack lasting four days. There had been no pain and no bladder symptoms, but on careful questioning the patient thought there may have been a slight uneasy feeling in the lower right quadrant

[15] Before sending this paper to the publisher a letter was received from Dr. C. C. Peters, of Princeton, W. Va., on March 3, 1922, containing the following additional data: "Since you treated the patient she has again married and has a child two years old, since which time she has been free from the hematuria until the last six or eight months, but this condition existed throughout her pregnancy in a very aggravating and debilitating way. Her present condition is one of rather profuse and obstinate hemorrhage." I instructed Dr. Peters that the question of possible focal infection areas should be carefully investigated and that she should have further ureteral dilatations.

during the attacks. On the first examination the bladder was found normal and a whistle-tip roentgen-ray catheter entered the right ureter only 3 or 4 cm. The slightly dilated pelvis of the kidney and ureter took 13 cc of thorium, and there was no evidence of kidney tumor.

On two subsequent treatments the spiral wax-tipped catheter went through the stricture area 3 cm. above the bladder and the final bulb dilatation was 4.6 mm. Report October 1, 1917: No further bleeding and no symptoms.

Case VI.—Mrs. L., aged twenty-nine years, referred August 2, 1917, by Dr. Jeffries Buck. For about one year she had been "dragging around and feeling poorly" and had attacks of pain in the left back, shoulder, and neck, usually exaggerated just before the menstrual period. In April, 1917, she had her most severe attack for two days before the menstrual period, culminating in a two-hour attack of extreme pain and headache and the passage of a stone which she felt cutting in the urethra and heard drop in the toilet, but did not recover. Since April she has felt much better, except for the two days preceding each of the four menstrual periods, when there has been an increase of her backache, pain in the left hip and pelvis, and a full day of hematuria forty-eight hours before each period. For the past four months there has been a sore, raw feeling in the left gluteal region just inside the sciatic nerve region and extending down the posterior thigh. This is exaggerated by taking vinegar or any acid food. There has been much diurnal bladder-pressure and desire to void, especially premenstrual and on taking acids. No nocturnal vesical symptoms.

Examination. The examination showed normal-appearing tonsils; one tooth gold-capped eight months previously; no evidence of sinus infection. The left kidney not palpable, not tender. The right kidney just palpable lower pole, not tender. Palpation of the left ureter at the pelvic brim elicits tenderness referred downward and a desire to void. In the broad-ligament region the left ureter is distinctly thickened for a distance of 3 or 4 cm. and pressure causes great bladder-pressure and a desire to void. The catheterized urine was clear but showed many erythrocytes microscopically; no leukocytes; no albumin. Culture negative. Cystoscopy negative. A small wax bulb on roentgen-ray catheter was obstructed permanently just after entering the left ureteral os. The pyelogram secured with 6 cc content showing small pelvis but slightly dilated ureter. Four dilatations between August 8

and October 18, 1917. No hematuria after the first. At my request the patient reported at the office on March 20, 1919, about eighteen months after her last treatment. She had gained twenty pounds and was in excellent health. She still had an occasional burning about the left hip which would disappear on the ingestion of some alkali. Urinary symptoms were entirely absent.

Case VII, (Fig. 3).—Mrs. B., aged forty years, referred December 6, 1917, by Dr. A. F. Ries, because of frequency of voiding. The patient was told by Dr. Ries six or seven years previously that she had blood in the urine. For four years she has voided too frequently at times. About six months ago she began to have pain and burning in the bladder, but the frequency has not been increased. At times there is slight pain in the right flank region.

She was operated on for gallstones two years ago, and about ten days later developed phlebitis in the left leg. This was fully recovered from. On examination the patient was found to be quite nervous; there was a loud, blowing, systolic murmur, loudest over the pulmonic area with accentuated second pulmonic sound; the pulse was rather rapid, the thyroid was slightly enlarged, and there was a suggestion of exophthalmos.

Cystoscopy showed infiltration of the urethra, a mild general congestion of the bladder, a few scattered vesicles over the mucosa, and some edema and redness about the left ureteral orifice. The urine showed a considerable number of leukocytes, some in clumps, a few epithelial cells, an occasional erythrocyte, and the faintest trace of albumin. I made a diagnosis of a mild chronic cystitis with a possible left pyelitis. Her physician was instructed to use bladder instillations of 1 to 1000 silver nitrate solution, and after her third treatment she felt so much improved she ceased treatments.

She returned in August, 1918, nine months later, complaining of bladder frequency and the passage of bloody urine for one month. There had been no pain. The bladder urine showed much blood, no pus, and about as much albumin as one would expect with the blood. Culture was negative.

After investigation a diagnosis was made of bilateral stricture, bilateral hematuria, and bilateral hydronephrosis, the right side holding 21 cc (Fig. 3) and the left side 15 cc.

This patient has been seen about every six to nine months for the past three years because of recurring hematuria. A brief sojourn in the hospital with two or three dilatations of the ureters results in a cessation of her bleeding and a gain in weight and

FIG. 1. (illustrating Case 1).—Pyelogram of left side taken June 11, 1920. This plate is of historical interest, as it illustrates the first case reported of ureteral stricture due to focal infection. Note pelvis holding 100 cc and ureter of only slight dilatation, in spite of renal colic history of sixteen years' duration. Renal pathology of recent years probably due to secondary kinks of or pressure on the upper ureter by the enlarged pelvis. Hematuria, intermittent, profuse, for past few months. Right kidney pelvis held 28 cc.

Fig. 2 (illustrating Case IV).—Recurring symptomless hematuria. Note. the "sagging" kidney with corresponding prolapse of the upper ureter and apparent "ureteral kink." Hematuria twenty-six years without pain symptoms and with sterile urine. Bilateral hematuria on her first examination in 1913. Monolateral, right side, bleeding of all subsequent examinations.

Fig. 3 (illustrating Case VII).—Bilateral stricture, bilateral hydronephrosis, hematuria of several years' duration. Recurring bilateral hematuria for three years, in spite of ureteral treatments. This plate shows the stricture area and the moderate dilatation of the ureter and kidney pelvis holding 21 cc.

FIG. 4 (illustrating Case XI).—The right ureter and kidney originally held 200 cc of fluid. At the time of making this plate, two and one-half years after her hematuria attack, the right tract held 70 cc. The plate was taken after injecting 35 cc of sterile water and then 35 cc of sodium bromide 20 per cent. Note the large ureteral stone displaced from the stricture area and upward into the abdominal ureter. Also note the failure of the water and the sodium bromide to mix, the heavier fluid remaining in the pelvic portion of the ureter.

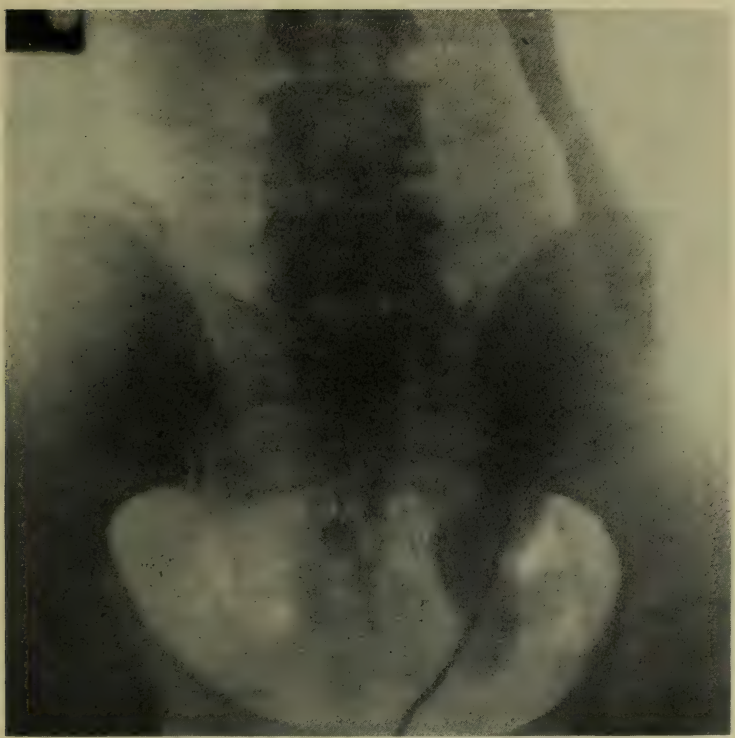


Fig. 5 (illustrating Case XI).—Note the dilated abdominal portion of the ureter displaced outward along the outer edge of the iliopsoas muscle, the absence of shadowgraph material where the ureter swings back to its normal position near the pelvic brim, and the dilated lower ureter down to the stricture area in the bladder-wall region. The first plain roentgen-ray plate with the shadowgraph catheter up to the kidney showed no stone, and showed a marked outward bend of the catheter near the pelvic brim region and the catheter lying along the outer border of the iliopsoas. Two plates with the bromide injection were practically identical.

Fig. 6 (illustrating Case XIII).—Right ureteral stricture, bilateral pyelitis, right hematuria. Plate shows the prolapsed right kidney with its distorted pelvis of 20 cc capacity, an apparent ureteral kink near the kidney, and dilatation of the abdominal ureter below the kink. Another plate showed this same uniform dilatation to extend to the stricture area near the bladder.

Fig. 7 (illustrating Case XIV).—Bilateral stricture, bilateral hematuria, left pyelitis. The plate shows an indefinite shadow of the left kidney with an apparent filling defect of the pelvis. Pyelograms taken on three different days showed this identical picture suggesting partial obliteration of the calices and pelvis by tumor. At operation a small interstitial nephritis kidney was found.

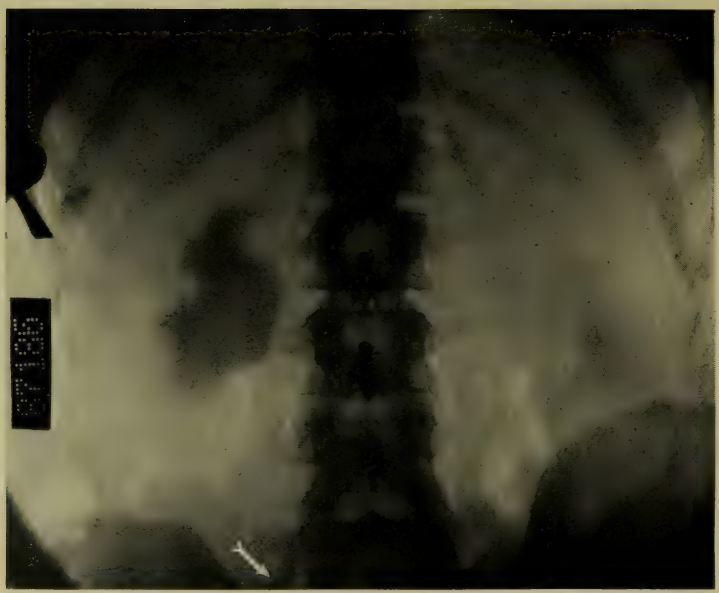


Fig. 8 (illustrating Case XV, see also Fig. 9).—Bilateral stricture, bilateral hydronephrosis, bilateral hematuria. This plate shows the right kidney in fairly good position but with a considerably distorted pelvis holding 20 cc. Note the dilated abdominal spindle of the ureter just above the pelvic brim. Another lower plate showed the stricture area within 3 cm. of the bladder and a slightly dilated pelvic ureter.

Fig. 9 (illustrating Case XV. See Fig. 8).—This plate shows a slightly dilated left kidney with a content of 12 cc and an approximately normal ureteral lumen.

general well-being. She never reports early in her recrudescent periods, and on her admission in August, 1919, her hemaglobin registered 40 per cent, and two days later 28 per cent. She had been unusually well up to two weeks previously, since which time the urine had looked like pure blood. Her pulse-rate was 148, she had air hunger, was cyanotic, and appeared to be threatened with heart failure. I did not dare begin ureteral dilatations but resorted to an injection of horse serum and gave calcium lactate by bowel. After forty-eight hours her condition continued so threatening that I decided to risk the ureteral dilatation in the hope of benefiting her condition, as we had seemingly done on previous occasions.

On passing a 4.5 mm. bulb on the right side there was no appreciable obstruction going in and no hang coming out, showing that the stricture area was not markedly contracted. The urine first collected through the No. 9 catheter was so bloody that it clotted on the sides of the test tube. The catheter soon became blocked with clot. Irrigation was not given as I was testing the effects of using the dilatation alone without further local measures in these hematuria cases. Two days later I dilated the left ureter with a 4.6 mm. bulb and got a distinct stricture hang, but the urine from the left side showed only moderate bleeding. Five days after the first dilatation on the right side the bladder urine had changed from the appearance of pure blood to a light cherry-wine color. Two days later the urine was macroscopically clear. The patient went home greatly improved after five weeks in the hospital. She was then induced to have several suppurating teeth removed and to take a course of cacodylate of soda injections.

When she again reported in June, 1920, nine months later, because of bladder frequency, the urine was free from blood microscopically and she had gained twenty-four pounds in weight. Her bladder irritation seemed to be due to a trigonitis, and one treatment with 10 per cent silver nitrate gave her complete relief. Two weeks later she was awakened at night with pain in the right side and a desire to void and passed clots. After five days of rather severe bleeding she again entered the hospital and had two dilatations on each side. Since June, 1920, there has been occasional bleeding usually occurring for a day or two before a menstrual period, but the patient has remained in comparatively good health.

Case VIII.—Mrs. R., aged forty-one years, referred by a former ureteral stricture patient in New York City. She consulted me June 18, 1918, because of a pain in the back which had been con-

tinuous night and day for two months. She has had backache since girlhood. Working or exercise seems to have no influence on the pain. She first consulted a surgeon in New York about blood in the urine six years ago. She took medicine internally and the bleeding ceased for a year. Five years ago the bleeding returned and she consulted Dr. John A. Hartwell, who has kindly furnished me with full notes on her case, showing that a thorough investigation was made by catheterization, roentgenography, etc., and that the final decision was for a nephrectomy for "hematuria of unknown origin." The bleeding was found to be entirely from the right side, and it was persistent and so severe as to produce a definite grade of anemia and ill health. The pathologist's report shows that there was a definite chronic nephritis with glomerulitis, increase in the connective-tissue stroma, and slight thickening of the pelvic mucosa. After her nephrectomy it took about one year to recover good health, and then she gained in weight and worked hard, although she still had some backache as formerly.

She had no more macroscopic bleeding, but about two weeks ago a voided specimen (not during a menstrual period) was examined at a clinical laboratory and there was a report of a few erythrocytes and a few leukocytes, the urine being otherwise normal. She had been subject to bad tonsils since she was five years of age, the tonsils being guillotined and the adenoids removed when she was eighteen. She continued to have trouble and the tonsils were again operated on when she was twenty-eight, and at the age of thirty-five the tonsils were completely removed.

A carefully centrifuged specimen of bladder urine was normal. Palpation of the left ureter through the vaginal vault showed an extremely tender ureter with pain referred back toward the kidney region. The left ureteral orifice was small, round, and surrounded by red mucosa. Investigation with a 3.5 mm. wax bulb gave a definite hang at about 3 cm. above the bladder. The urine from the kidney was negative for leukocytes and on culture.

The patient had dilatation of the stricture area on June 18 and November 29, 1918, and on February 7, 1919.

Our last report, on December 3, 1921, says, "I have been very well indeed since my last visit to Baltimore, and as an indication my weight has increased about twenty pounds."

Case IX.—Mrs. B., aged forty-eight years, referred July, 1918, by Dr. Walton Hopkins, of Annapolis. Three years ago the patient had profuse hematuria. Dr. Page Edmunds, of the University

of Maryland, found the blood was coming from the right kidney, and after his investigation the bleeding ceased. Three weeks ago she again had hematuria lasting eight days. The first hematuria, three years ago, was symptomless, but since that attack there has been more or less steady discomfort in the right kidney region, and this was exaggerated during her second hematuria attack three weeks ago. With the last attack there was severe pain in the bladder with much frequency of voiding night and day. She still has some pain in the back and in the bladder, and there is some frequency. She is now voiding only once or twice at night.

Examination. Urine catheterized from the bladder normal and negative to culture. Right kidney easily grasped below the costal margin, normal size, somewhat tender. Quite tender on pressure over the ureter pelvic brim region, with desire to void. Palpation of the right ureter in the broad ligament region causes desire to void and "my old pain in the side." Ureteral investigation with the wax-bulb catheter reveals a diffuse stricture 7 cm. above the bladder. Three treatments were given on July 12, August 12, and October 1, 1918, the last with a 5.5 mm. bulb. There was very little pain in the side after the first treatment, none after getting over the effects of the second treatment, and a letter from Dr. Hopkins in May, 1921, said the patient had been free from symptoms since her last treatment nineteen months previously.

Case X.—Mrs. W., aged forty-one years, referred by Dr. C. W. Hoffman, March 10, 1919. The patient was operated on thirteen years previously for perineal laceration. During convalescence she developed bladder trouble. Bladder symptoms continued intermittently for many months, finally ceasing entirely. Three years ago she again began with bladder frequency, and one year ago the frequency increased. Constant bladder pain began, and in June, eight months ago, she began to pass blood, and there has always been blood in the urine since. There has been no pain in the kidney regions, except when she turns to the left side at night she can feel something drop in the right flank and there is a painful dragging sensation in this region.

The patient brings a port-wine colored specimen of urine.

The tonsils appear normal, the upper teeth are artificial, the lower jaw carries some bridges, gold caps, and large fillings.

The urine catheterized from the bladder shows about one-sixth volume of bloody deposit on the bottom and microscopically this sediment is composed mostly of erythrocytes, but there are rather more leukocytes than would be accounted for by the blood and some rod bacilli.

Examination. The patient appears anemic; the heart sounds are normal but rather rapid; neither kidney is palpable; no tenderness in the upper abdomen. The right ureter in the broad ligament region seems thickened and infiltrated and very tender and the patient says this is the seat of her bladder pain. Dark bloody urine is catheterized from the bladder. The urethra seems very tender. The right ureteral orifice appears normal and urine gathered directly through the speculum looks clear, but on microscopic examination it shows a number of leukocytes, some in clumps, a number of rod bacilli, and an occasional erythrocyte. The urine gathered directly from the left ureteral orifice comes in large jets and is very bloody. On microscopic examination it shows myriads of erythrocytes, about as many leukocytes as would normally be present in the blood, and no bacteria. From the history of occasional dragging pain in the right kidney region and the microscopic findings of pus and bacteria in the urine directly from the right ureter a probable diagnosis is made of right-sided pyelitis. The chief hematuria is coming from the left kidney.

On March 18 a renal catheter with whistle tip and 4 mm. wax bulb is passed to the left kidney, and on withdrawal the bulb has a very firm hang at a point 2 cm. above the bladder. After this one examination the patient had decidedly less bleeding until two months later, when after extra heavy work as a nurse the patient had a severe attack of pain in the right kidney region and in the bladder, and there was an increase in the blood in the urine. Five months later the patient reported that she had seen no blood in the urine since the May attack and her only complaint at that time was the constant urgency and pain in the bladder. The bladder urine at this time showed a few erythrocytes and a few leukocytes. I was never able to get the patient to have further treatments, and in answer to a letter in September, 1921, the patient said she had just recovered from a bad hematuria attack and that she was still suffering from the pain in the right side. "I find when I get my feet wet or take cold it brings on the bleeding."

This has been an unsatisfactory patient because of inability to get her to allow a thorough investigation of both sides, but from our partial investigations it would seem to be a case of bilateral stricture, with pyelitis and some hematuria on the right side and the chief hematuria from the left. There has not been enough pus to make one think seriously of tuberculosis.

Case XI (Figs. 4 and 5).—Mrs. P., aged thirty years, seen at the Hebrew Hospital, April 5, 1919. This patient illustrates many

of the pathological results and clinical vagaries one meets in dealing with ureteral stricture.

She had bilateral stricture with a kidney and ureter content on the right side of 200 cc and on the left side of 60 cc. There had been mild attacks of pain in the lower right quadrant for twelve years, and on several occasions she had been advised to have an appendix operation. There had never been pain on the left side, and this was investigated only because of the puffy red, edematous appearance about the left ureteral orifice, and because repeated phthalein tests, with a catheter in the right kidney and the secretion from the left side being gathered through the bladder, had shown the best work being done by the manifestly damaged right side.

In addition to the possession of a markedly dilated pelvis and ureter on the right side without pain or tenderness in the kidney region this patient illustrates the tendency of ureteral stricture results to become exaggerated during pregnancy, and the tendency to stone formation in a stricture area. The patient entered the hospital when in the third month of her fifth pregnancy, complaining only of a profuse hematuria of five days' duration. She had a temperature of 101°, but looked well and said her health had been excellent except for an attack of influenza four months previously.

We found on investigation that the bleeding was from the right side and that the urine from the left side, gathered directly through the speculum from the ureteral orifice, was macroscopically perfectly clear. Unfortunately a microscopic report was not made on this first specimen from the left side. The right side showed a colon bacillus infection and a fairly large number of leukocytes.

The bleeding entirely ceased after three dilatations of her right ureteral stricture within a month. Three more dilatations were given within the next month, carrying the wax bulb up to 5.6 mm. Her pregnancy was then advanced to the sixth month and she had an uneventful term delivery October 25, 1919.

At my request the patient returned for observation on March 1, 1920, when her baby was five months old. She was looking extremely well and said that her last labor was the easiest she had ever had. There had been no bladder symptoms and no visible blood in the urine. She had had four necrotic tooth roots extracted. She was now complaining at times of her old slight pain in the lower right side and had begun to complain of pain in the lower left side. Investigation showed that the right ureteral stricture had remained well dilated and the ureteral and kidney content had dropped from

200 cc to 100 cc. The urine still contained leukocytes and bacteria but no red blood corpuscles.

The first attempt to catheterize the left side was made April 8, 1921, when the catheter was permanently obstructed after the bulb entered the ureter. It could not be determined whether this was an obstruction to the bulb, for on withdrawal the catheter end was found doubled back on itself. A second attempt to catheterize the left side made in December, 1921, was successful and stricture was located in the bladder-wall region and after the slow injection of 80 cc to discomfort, 60 cc returned in a steady stream. On February 8, 1922, the left side was again dilated and Fig. 5 was obtained, the kidney and ureter content having dropped to 40 cc.

During September and October, 1921, the patient had several severe colics on the right side, much more severe than she had ever had before, and during such an attack in November I obtained the plate shown in Fig. 4. There had been several plates taken before, none of them showing stone. She had instant relief after the stone had been displaced out of the stricture area and did not have another attack until two months later. On January 21, 1922, she developed another severe attack and she was sent to the hospital at once. Before anesthesia the large stone could be plainly palpated through the vaginal wall, where it could have been reached with ease by a vaginal incision. After the patient was relaxed by general anesthesia the stone could not be palpated, and I removed it through an extraperitoneal semilunar line incision. The right ureter was 3 or 4 cm. in diameter and looked more like an intestine. On making the stab wound into the ureter the static urine shot out through our abdominal incision. The ureteral wall was 2 or 3 mm. thick.

Case XII.—Mrs. Y., aged thirty-seven years, referred by Dr. Robert Tyson, of Frederick, Md., because of hematuria which had appeared daily for one year. Usually the urine was very dark, at times clear. No bladder symptoms. Considerable dull aching pain across the lower lumbar region. A pressure in the epigastrium with occasional nausea and water-brash. She had suffered for years with dental trouble and her last eleven teeth had been extracted three months previously.

The physical examination was negative except for the extreme anemia and a movable right kidney which could easily be grasped below the costal margin. The kidney seemed of normal size and consistence and was not tender. The urine catheterized from the

bladder looked like black coffee. It was free from pus and negative to culture.

On cystoscopy the bladder, trigonum, and ureteral orifice region appeared normal. Urine gathered directly from each ureteral orifice through the Kelly speculum showed the bleeding to be entirely from the right side.

Catheterization of the right kidney with a No. 8 renal catheter and small wax bulb showed obstruction going in and a hang of the 3.6 mm. bulb coming out at a point 3 cm. above the bladder. The first roentgen ray with 8 cc of shadowgraph fluid showed only the tips of the calices and suggested that the pelvis may have been obliterated by tumor pressure. A second roentgen ray with 16 cc injection showed normal calices and the slightly dilated kidney pelvis fairly well filled. Both plates of the ureter showed irregular local dilatations, one of these being just above the stricture area near the bladder.

This patient had seven dilatations of the right ureter beginning in February, 1919, and ending in October, 1919. The bleeding diminished markedly after the first two treatments in February and March. On her return in April her color was vastly better and she said that she was feeling much better and could do her housework with but little exertion. The urine, which was almost black before her first treatment, had now become a light red color and it continued to hold this color on the monthly examinations until her last treatment in October. Unfortunately we did not get her hemoglobin on her first visit, but on her third visit in April, after there had been marked visible and symptomatic improvement, the hemoglobin was 40 per cent. By the end of four months she had gained seven pounds. We have not seen her since her seventh treatment in October, 1919. From that time on she was under a heavy strain during the final illness of her mother and the bleeding kept up until her mother's death, when she was able to take more rest. In January, 1921, she wrote that the bleeding had entirely ceased in September, 1920. This was about one year after our final treatment. She had gained twenty-five pounds in weight and was well, having lost her indigestion, heartburn and water-brash which she had on admission.

Case XIII (Fig. 6).—Mrs. V., aged sixty-four years, referred to Johns Hopkins Hospital by Dr. Eugene Douglas. The patient had always had good health. Blood in the urine was present for the last thirty-eight days. One year ago had hematuria one day

without symptoms. No history of tonsillitis, sinusitis, or dental trouble, but the teeth have all been extracted and the tonsils are hypertrophied, and cervical glands are enlarged. Heart shows mitral insufficiency, well compensated. Both kidneys prolapsed, marked visceroptosis. Phthalein test with renal catheter in the left kidney shows an appearance time of twelve minutes on either side. The specimen collected from the right kidney through the bladder was too bloody for reading. The left kidney secreted during the first hour 100 cc, 9 per cent; second hour 50 cc, 7½ per cent. Dr. Shaw, the resident gynecologist, showed me a roentgen-ray plate (Fig. 6) showing a prolapsed right kidney with deformed pelvis, and another lower plate showing a definitely dilated ureter, and said he was planning to operate the following day and do a nephrotomy and fixation because of symptomless hematuria. I asked whether he had tried the results of thorough dilatation of her ureteral stricture, and he said she had no stricture for the large renal catheter passed to either kidney without obstruction. I asked him to make the wax-bulb test and stricture was found and the patient ceased bleeding after the second dilatation.

The left side was not tested with the bulb or pyelogram, so we have not diagnosticated stricture on that side; but with the delayed appearance time in the phthalein test, and from the two facts that the percentage output was low on the left side and the delayed appearance time was the same as on the manifestly damaged right side, I think it fair to suspect that the patient had bilateral stricture.

She went to Cuba soon after her treatments and Dr. Douglas thinks he would have heard from her if there had been return of symptoms.

Case XIV (Fig. 7).—Mrs. S., aged thirty years, entered the Johns Hopkins Hospital Dispensary August 19, 1919, complaining of excessive hematuria and weakness from loss of blood. She had noticed some blood in the urine for five or six years, but had paid no attention to it. For about four years she had had intermittent pain in the upper right flank region. For the past two weeks the urine has been unusually bloody. She has always suffered with intermittent tonsillitis. The tonsils are large and deeply cryptic. The lower third molars show overhanging spongy granular gums and on pressure on the left side pus exudes from several openings.

On investigation the bleeding was found confined to the right kidney, which was negative for pus and on culture. The left kidney, which had never had pain symptoms, was found to be the seat of a

colon bacillus pyelitis with considerable pus. The urethra was infiltrated and the bladder mucosa showed some increase in vessels and many vesicles. The trigonum and ureteral orifice regions showed redness and edema. Investigation of the right ureter with a small wax bulb gave only a slight hang, which was considered due to the edema in the bladder wall. Dr. Shaw, the resident gynecologist, investigated the left ureter with apparent negative results as to stricture. The patient was kept in the hospital for six weeks for observation and for irrigation treatment of the left pyelitis. A thorium roentgen ray of the right kidney showed a slightly large but normal looking pelvis. The hematuria persisting we did a right nephrotomy on September 27, 1919. The kidney appeared normal and a slice taken from the cut surface of the cortex was quite normal microscopically.

On February 12, 1920, four and a half months later, the patient again presented with a history of having done nicely since operation until the previous day, when she again saw blood. For one week she had noticed some increased frequency and some slight burning in the bladder. Then she had rather sharp pain in the right kidney region and slight pain in the left kidney region, and with the next voiding she saw blood.

On examination there was considerable vesicular cystitis over the posterior bladder wall and marked bullous edema over the trigonum. The bladder urine was dark red and contained myriads of erythrocytes; no more leukocytes than accounted for by the blood; a considerable quantity of albumin probably due to the blood; no casts; no bacteria. Urine gathered through the speculum from the right side looked perfectly clear and showed an occasional erythrocyte but no leukocytes. Urine from the left side was red and microscopically showed many red cells and no more leukocytes than from the blood.

This entire picture of a return of bladder symptoms followed by pain in both kidneys and hemorrhage, and the cystoscopic findings of increased edema over the bladder without evidence of infection in the urine, suggested a fresh toxemia of some sort affecting the entire urinary tract. The patient had had her necessary dentistry done but had refused to have her tonsils removed. It is interesting to note that the chief bleeding was now coming from the left kidney, which had not shown blood on her first hospital visit, but may have been the source of bleeding during the former years.

For the succeeding year the patient was seen every few months because of return of bleeding from the left kidney. In January,

1921, we got pyelograms of the left kidney on three different days and each of them showed the suspicious filling defect of the pelvis seen in Fig. 7. Fearing that this might mean a tumor I operated on January 22, 1921. Before making the incision I said to the students that we knew the patient had bilateral stricture and we knew she had bad tonsils, but the strictures were remaining well dilated and she continued to bleed from the left side; and with such a roentgen-ray picture we did not dare withhold exploratory operation. If we found no growth or macroscopic cause for the bleeding, and if she returned later with bleeding, we would refuse to dilate the ureters again until we had tried the therapeutic value of tonsillectomy which the patient had so far refused.

Operation revealed a small interstitial nephritis kidney. In June, five months later, the patient was back with hematuria. Dr. H. C. Davis removed the tonsils on June 15. She had been bleeding for two weeks before the tonsil operation and continued to bleed for two weeks after. By request she returned for investigation on August 30 and reported that there had been no bleeding since July 2. The catheterized bladder urine was negative for blood but showed a number of pus cells and bacteria. She probably had a pyelitis following a somewhat protracted drainage of her nephrotomy wound.

She returned to the dispensary by request on December 6, 1921, reporting that there had been no further bleeding and that she had been doing nicely, with the exception of getting too stout and having swelling of the legs if on her feet too much. Microscopic examination of the bladder urine showed many pus cells and bacteria and a number of erythrocytes. There were no casts, and on boiling there was the faintest trace of albumin. She was menstruating at the time, and whether this, together with a pyelitis, determined the slight amount of blood in the urine is a question. She promised to return if further symptoms developed.

Case XV, (Figs. 8 and 9).—Mrs. F., aged thirty years, admitted to the Johns Hopkins Hospital November 30, 1920, showing a picture of cardiac failure and having bloody urine.

Tonsillitis as a child and repeated sore-throat up to the present. Rheumatic fever at twenty-two, again at twenty-six, and a third attack five months ago.

At twenty-eight years of age, while pregnant, she had influenza with pneumonia. In her second attack of rheumatic fever she had palpitation of the heart and swelling of the feet and ankles. These

symptoms gradually disappeared. In her third attack in June, 1920, the patient had acute pain in the heart region, and remained in bed eight weeks with rheumatic fever. She then recovered fairly well and was able to be up and about from August until November 23, but she was not strong and one week ago she was taken with shortness of breath, having to sleep sitting up in bed. The feet and ankles, hands, and abdomen have swollen, and there has been some cough. She had not had bladder symptoms, but on admission the urine was bloody and contained blood casts.

After a careful medical examination a diagnosis was made of chronic rheumatic endocarditis, cardiac hypertrophy, mitral and aortic insufficiency. Because of the rather severe hematuria and the presence of erythrocyte casts a suggestive diagnosis was offered of subacute nephritis. Dr. Wharton, the resident gynecologist, saw the patient two weeks after admission and gathered urine directly through the cystoscope from either kidney and found apparent bilateral renal hematuria. The patient was considered to be unfit for pyelography. Her hemoglobin had fallen from 80 per cent on admission to 62 per cent. Her two-hour phthalein output had risen from 34 per cent on admission to 60 per cent. In the next four weeks the patient's anasarca disappeared, but she had no appetite, continued to lose weight, and the hemoglobin remained stationary in spite of rest in bed, tonics, and dietary measures.

Dr. Wharton was asked to see the patient again in January, 1921, when the thorough urinary tract examination revealed bilateral ureteral stricture with bilateral hydronephrosis of moderate degree and bilateral symptomless hematuria (Figs. 8 and 9).

After two dilatations on either side the hematuria completely ceased and the patient immediately began to gain from four to six pounds a week, and she was dismissed on March 15.

The patient was seen eight months later, when she reported having done all her housework since returning home, and that she had felt as well all summer as she had ever felt. She still had some of the pain in the back and some swelling of the legs if she overexerted. The heart showed a presystolic and systolic murmur over the mitral area, but the rhythm was regular at 80 per minute. She had not seen blood in the urine and the urinalysis was absolutely negative.

Case XVI.—Mrs. M., aged forty-two years, referred April 1, 1920, by Dr. J. K. B. E. Seegar. For about five months there has been some discoloration of the urine varying from just a

noticeable dark color to a coffee black. For some weeks past three has been an aching in about the midflank region on the right side and a "weak back" in the lumbar region. No bladder symptoms. No history of tonsillitis. There appears to be a bad dental condition including pyorrhea. The patient appeared anemic. The left kidney was not palpable nor tender. The right kidney is easily grasped below the costal margin on quiet breathing; seems of normal size and not at all tender. The right ureter is tender over the pelvic brim region and the left ureter is tender in the broad ligament region. Investigation showed bilateral stricture symmetrically located 6 cm. above the bladder. The urine was quite normal except for the bleeding from the right side.

Five dilatations were made on the right side between April 1 and June 21. The last dilatation was made with a 5.6 mm. bulb, the bulb obstructing in the stricture area and showing a depressed ring-like indentation in the wax made by the stricture. This made a dilatation of about 5.3 mm. The pain in the right flank had disappeared and the bleeding had shown a tendency to become more intermittent. Dr. Seegar wrote me in May, 1921, that the patient had been free from bleeding for some time during the fall, but there had been intermittent bleeding lately and some backache. In September, 1921, Dr. H. B. Hood, her family physician, reported that he had seen the patient about July 1, when she looked well and her health seemed exceptionally good. She still had slight bleeding at times.

Case XVII.—Mrs. W., aged twenty-six years, referred December 1, 1919, by Dr. S. F. Pfohl, of Winston-Salem, N. C. The patient complained of severe bladder symptoms, severe colicky pains in both upper flanks, and hematuria. For one to two years before her marriage six years ago she complained of some burning in the bladder and of some frequency, often getting up four or five times at night. At that time there was no pain in the back or flanks. During her three pregnancies the bladder symptoms have been increased and there was difficulty in control, but no actual incontinence. She dates the onset of the pain in the flank regions and the hematuria since just after the birth of her second child three years ago. All of her symptoms are worse for a week before and during the menstrual period, when her usual nycturia of about three times at night is increased to almost sleepless nights of voiding. During the premenstrual week there is severe colicky pain in both flanks, being much worse on the left side. The bleeding has been

practically continuous for three years and often causes great bladder distress in getting rid of the clots. At times she has a day free from bleeding, but for the past month there has not been a day without the passage of clots.

The examination showed small adherent, inflamed-looking tonsils (Dr. H. C. Davis). She had one abscessed tooth removed two years previously after a year of trouble. There were some large fillings and some devitalized teeth. Heart and lungs normal. Left kidney not palpable; some tenderness in the left kidney region. Right kidney just palpable at lower pole; some tender. Quite tender over both ureter-pelvic brim regions and in the ureter-broad ligament regions. In the left broad ligament the ureter seemed distinctly thickened and extremely tender, making one think of tuberculosis. Bimanual palpation of the bladder showed much tenderness but no evidence of tumor. Cystoscopy revealed a densely infiltrated urethra; the bladder mucosa in general was pale white, normal appearing except in the anterior vertex, where there was a large area of redness and edema covering an area about 15 mm. in diameter. This was granular and on touching it bled easily. There was also edema and redness about each ureteral orifice. The urine from the bladder was dark red and showed an abundance of blood, pus, bacteria, and albumin; no casts; no tubercle bacilli on repeated examinations. Urine gathered from each ureteral orifice directly through the speculum showed many erythrocytes, some leukocytes, and some bacteria. Later investigations showed stricture on both sides with bilateral pyelitis (colon) and bilateral hematuria.

With the ulcer in the bladder it was difficult to judge what proportion of the patient's hematuria might have come from this source. I at first favored the probable diagnosis of tuberculosis of the urinary tract, although there were certain features that made me think of a focal infection process resulting in stricture of the urethra and of the ureters and in elusive ulcer of the bladder. Against elusive ulcer was the rather large size of the inflammatory process, the presence of such active bleeding, practically never seen with elusive ulcer, and the presence of bacterial infection and much pus. This patient could hold 300 cc of urine, an unusual amount for a patient with elusive ulcer. After investigating and finding ureteral stricture I felt that we had the probable explanation of the bilateral hematuria, and that the pyelitis accounted in most part for the large amount of pus in the bladder urine. The negative examinations for tubercle bacilli were an aid in the final diagnosis,

and the best evidence that we were not dealing with tuberculosis was the rapid way in which the hematuria and pyuria improved after dilating the ureters.

After the one preliminary dilatation of each ureter and mopping the bladder ulcer and trigonum with 10 per cent silver nitrate solution on two occasions the patient went home for the Christmas holidays and returned February 9, 1920. There had been far less bladder distress and very little bleeding. The bladder ulcer was still so widespread and irregular appearing that it made one think of the possibility of neoplasm. Urine gathered directly from each ureteral orifice showed that there was still some hematuria and pyelitis on either side. After two further dilatations on the left side and one on the right, between February 9 and 20, the hematuria had almost ceased. There was still a slight smokeiness of the urine when we operated on February 27, 1920, to remove the bladder ulcer. On April 6, before the patient's dismissal, the urine was still cloudy but there was no macroscopic suggestion of blood. Microscopically the urine contained pus and bacteria.

The patient was to return for further dilatation of the ureters in the fall, in the attempt to clear up her pyelitis, but domestic conditions have prevented her return. A letter from the patient on August 12, 1921, sixteen months after her dismissal, reported that she had not seen blood in the urine and the bladder symptoms were gone, but she was still suffering with pain in the kidney regions, which was rather worse now on the right side.

Case XVIII.—Mrs. H., aged thirty-six years, referred in April, 1919, by Dr. E. H. Kloman, as a case of symptomless hematuria of three months steady duration. On careful questioning I found this patient complained that for six years there had been intermittent pains of a low grade in the left kidney region and in the lower left abdomen—deep, back of Poupart's ligament. With this data which she had not considered worthy of previous mention I predicted that we would find left ureteral stricture with left hematuria. My surprise was complete when investigation showed clear normal urine from the left side and very bloody urine from the right. I then altered the probable diagnosis to bilateral stricture causing pain on the left and symptomless hematuria on the right side. Wax-bulb tests and the roentgen ray verified this, and the patient has remained free from bleeding after three dilatations on the right and one on the left side.

DISCUSSION ON THE PAPERS OF DRS. SULLIVAN, HUNNER AND BRYAN

Dr. James N. Baker, Montgomery, Ala.—The three papers which have just been presented before this body are quite interesting. I desire to make a few remarks regarding Dr. Hunner's paper.

For several years I have had more than a passing interest in the question of ureteral stricture and pyelitis being productive of symptoms which were frequently either unrecognized or else misinterpreted. Last year before this Association I presented a study of 50 cases of ureteral stricture and pyelitis in which was stressed the importance of establishing free drainage for the kidney above by thoroughly dilating any stricture areas in the ureter below. A failure to do this and to remove contributing remote foci of infection frequently result in incomplete cures or recurrences.

The question of essential hematuria is one of absorbing interest to the surgeon who is conscientiously striving to find out the real cause of the bleeding. In this connection I should like to report the following case: Female, married, aged fifty-three years, the mother of five children, with no symptoms of cardiovascular disturbance and a normal blood-pressure. The presenting symptoms were bloody urine, some vesical tenesmus and vague pains in both loins and lower abdomen. She gave a history that when twenty-two years of age, a short time after the birth of her first child, upon lifting a heavy load she strained herself, since which time both kidneys had been "floating." This statement was certainly true, for I do not think I have ever seen a more pronounced ptosis of both kidneys, the right being somewhat more ptotic than the left. Twelve years previously she had suffered with hematuria for four or five days, which cleared up without special treatment. Cystoscopic examination was absolutely negative for any bladder tumor, stone or ulcer. Both ureters were definitely negative for stricture when tested with wax bulb. A pyelogram of the right side was likewise negative for tumor, stone or other pathologic condition, as also was a pyelogram of the left side. Catheterized specimens from each kidney showed the blood to be coming entirely from the right kidney. In the face of these negative findings—no stone, no stricture,

no ulcer and no tumor—the conclusion was drawn that this patient was suffering from a right-sided hematuria, the cause being most likely venous stasis from excessive mobility. Three or four days after the cystoscopic manipulations and the catheterizing of the ureters, and with rest in bed and foot elevation, the blood in the urine cleared up and has remained. In closing, I should like to have Dr. Hunner touch upon the point of ptosis of the kidney with venous stasis as a contributing factor of essential hematuria.

Dr. Hermann J. Boldt, New York City.—In one of the cases presented by Dr. Hunner I noticed in one kidney that there was a double kink. I should like to know how the bougie which is used for dilatation purposes passes over this seemingly double kink.

With reference to Dr. Bryan's paper, I was interested in his calling enlargement of the prostate an hypertrophy, which is frequently the name given to this condition. Recently, Blum, of Vienna, said the name hypertrophy applied to an enlarged prostate is a misnomer; that it is in reality an adenoma of the prostate. I do not know how surgeons usually feel about that, but he believes that adenoma is the proper term to use and that hypertrophy is a misnomer. Furthermore, he asserts that all cases examined postmortem who were at the time of death more than fifty-five years of age showed a very large per cent had adenoma of the prostate without giving symptoms during life; that in all instances of adenoma of the prostate 14 per cent became carcinomatous.

The next point I should like to ask about is: Is it essential to remove prostates if they give minor symptoms so long as residual urine is not present in those cases? We all recognize the fact that when a prostate does give serious symptoms it should invariably be removed and that in every instance one should operate on these cases the moment residual urine is present.

Dr. Francis R. Hagner, Washington, D. C.—The point that Dr. Sullivan brought out regarding perinephritic abscess due to involvement of the kidney is an important one. After seeing the specimen of furunculosis of the kidney he presented it recalls to my mind a case we had in a little girl whose kidney we saved by removing the infarcted area. We took out wedge-

shaped pieces, sewed up the kidney and drained the kidney in two places, and she had a useful kidney afterward, with over one-half the amount of phthalein eliminated from that side after operation that the unaffected side showed.

I do not know of anyone who deserves more credit for his work in connection with ureteral stricture than Dr. Hunner, who is a pioneer in that work. Many of us fail to find ureteral stricture quite as often as Dr. Hunner does. We have to consider always the physiologic narrowing of the ureter, and in the cases Dr. Hunner has shown there is no question at all about a number of them being border-line cases. It is questionable with me whether some of these cases have stricture or not.

In the cases of pyelitis of pregnancy he spoke of we have been lavaging these cases with 3 per cent nitrate of silver with good results. They all have retention due to the pregnant uterus and pressure upon the ureter. Some desperate cases have recovered and go on to the end of their pregnancy.

He spoke of symptomless hematuria in stricture of the ureter. Nearly every case he has reported is not exactly what I should call symptomless hematuria. Most of the cases that I should call symptomless hematuria are those that do not have any pain. Blood in the urine is the only symptom they have. I have been much interested in this subject because some of you may remember that I reported a case of hemorrhage of thirty-six years' duration. The patient had been seen by the late Hunter McGuire and others up to that time, who advised against operation. I passed the ureteral catheter on him. His hemorrhage stopped and he is now alive and about seventy years of age. He has never had a recurrence of the hemorrhage. I do not know what did it. There may have been a structure of the ureter. A No. 6 catheter was passed and he never bled again.

I have watched cases I had twenty years ago and I have followed cases of symptomless hematuria, and in a large number of them it was early arteriorenal disease that caused the hematuria. I have seen several cases that I had attended many years before with late arteriorenal disease that had early renal hematuria. I remember one man who had persistent hematuria. I split his kidney from pole to pole and found nothing pathologic at all. I did not take a section of the kidney at the time for examination. He had no bleeding for three years. At the end of that time he had a recurrence of

bleeding and I saw him nine years later in a dying condition from arteriorenal disease.

I was much interested in Dr. Bryan's paper. I think the term adenomatous prostate is a good one because it is not an hypertrophy of the prostate, and I think every man who does this work feels he should take the whole prostate out. The growth begins in the glands in the posterior urethra and grows through the internal sphincter into the bladder, the prostate being pressed against the capsule until it is as thin as a piece of paper. I feel personally, in many cases, we have no recurrence of the obstruction, but we have had patients come back with just as normal prostates as before, and if I had not taken them out myself I should state they had never been removed. I recall one case of a man of Jewish persuasion only five feet tall. I took his prostate out when he was sixty years of age. This man has since come back with both lateral lobes present, so that one would hardly believe that his prostate had ever been removed. He had no residual urine, and has sexual connections just as well as he had before and has ejaculations of fluid in the same amount.

Dr. Charles H. Mayo, Rochester, Minn.—I was glad Dr. Sullivan discussed hematogenous infections of the kidney because they represent probably 90 per cent of such infections; and while in this country we have had a number of papers dealing with the improbable routes of infection, these are important as being more common in children. It is true the kidney is capable of a great deal of repair, much more than we should think possible in the adult. In children with acutely infected kidney, if the kidney is decorticated and stabbed with multiple punctures to allow the exudate to escape, thus reducing tension, the kidney may overcome the infection. If the children die they usually die of what we call cloudy swelling of the kidney; the kidney is choking itself to death with its own retained secretions. The kidney being an eliminating organ acts as a filter and not as a secretory gland. With stones in the kidney we have a type of bacteria to deal with similar to those producing boils or furuncles of the skin. These will bring about the same conditions in the kidney, because the filtering surface of the kidney if spread out would have an equal or greater area than the skin.

I presented a paper before this Association at New Orleans

a few years ago showing the local development of the mollusk shell in which the mollusk by its mucoid exudate furnished bed and board for bacteria which build the shell. Such workmen, if misplaced, build stone. Today we can form stones in the kidneys of dogs at will through the development of chronic foci of infection. Dr. Hunner referred to this in his paper as a possible source of hemorrhage of the kidney. It is difficult to know how many of these patients might have had infected tonsils removed with cure of the hematuria.

I take issue with Dr. Hunner. I believe that his cases are muscular spasm of the lower part of the ureter and not stricture.

Dr. Bryan (closing on his part).—Hypertrophy of the prostate as taught in text-books on pathology would be due to connective-tissue hypertrophy and glandular hypertrophy. I did not discuss connective-tissue hypertrophy, because I did not think it was necessary, as this type is not likely to recur.

Recurrence of the prostate is an absolute fact. A patient does not understand—when, after prostatectomy, he goes to various doctors and they find a prostate—what has happened if somebody does not tell him the tumor was taken out. He comes back for something that has been taken out. I think in many cases we are capable of doing one another injustice. I am sure in that first case I did the man who operated on that patient an injustice.

Another point is with reference to the so-called adenomatous prostate. I think that is a good name for it if we would add myo- to it. I think most likely they should be more properly called adenomyomata of the prostate rather than simple adenomata.

Dr. Boldt asked if we would advise operation for the removal of a prostate in case the man has no residual urine and only minor symptoms. It is rare that a surgeon ever sees a case of that kind. If I should see a patient of that kind I would advise against operation unless the symptoms were sufficient to make him and me feel that operation was justifiable. That applies to residual urine and other symptoms. In the case of a man who has three drams of residual urine and does not have to get up at night I would not operate; but just as soon as his symptoms disturb him and he has to get up at night, he is a candidate for surgery.

Dr. Hunner (closing the discussion).—I am sorry I did not have time to show some of the more striking slides to illustrate the pathologic changes, but you will find them in the report. I have seen but 3 cases of hematuria in men in the last year, and in 2 of these Dr. George Walker applied the wax-bulb test and pyelograms and demonstrated strictures. One male case that was being treated for hematuria by Dr. William Neill at Dr. Kelly's sanatorium showed a dilated ureter and dilated kidney pelvis. Of the last 18 cases I have had in the last three years 3 were treated before for hematuria and 15 of them were new consecutive cases.

Dr. Baker is quite right in concluding that with these extremely prolapsed kidneys we have venous stasis and trauma. Urinary stasis from kinks at the ureteropelvic junction may be even more complete and harmful than the stasis due to stricture in the lower ureter.

In reply to Dr. Boldt's question as to how bougies that are used for the purpose of dilatation pass over these kinks near the kidney, I will say that I tried to make it clear that we pay no attention to the apparent kinks in the upper third of the ureter as indicated by the pyelogram.

If one takes care of the stricture in the lower ureter the apparent kinks will take care of themselves. These kinked cases do not need operation. On the other hand, those cases that show a tremendously big pelvis, where the stricture has caused hydronephrosis, increased weight of the kidney, prolapse of the kidney and secondary obstruction by kinks or valves the kidney region needs some form of operation.

Dr. Hagner spoke of physiologic narrowings of the ureters. These strictures do not occur at the points of natural physiologic narrowing in the ureter, but they occur about 3 cm. above the bladder in the broad ligament region and at the bifurcation of the anterior iliac vessels, where there is another group of lymphatic glands. It is probably the lymphatic glands that sift the focal infection out of the circulation and then the inflammation gets over into the ureter. That in a way answers Dr. Mayo's question about spasms of the ureteral muscles. In the first place I should like to ask him if it is a spasm, why does it not occur in any portion of the ureter, and why always at a given point in the same patient? You get your "hang" at a definite number of centimeters from the outside. There is something going on there that tends to

cause obstruction in that region, and Dr. Mayo says you may find some round-cell infiltration in that area from overactivity of the ureter. I do not know of any round-cell infiltration unassociated with inflammation. There is some inflammatory condition and you get your "hang" in the same place, and if there are two strictures you get the "hang" in the same places in the individual case.

I have tried the suggestion of Dr. Caulk, of St. Louis, who states that if we would use belladonna before catheterizing we would not find so many strictures. Geraghty asked me to use ureteral injections of papaverin, leaving the solution in for five minutes, and agreed that if I still got a "hang" of the bulb it was an indication of organic stricture. So far as I can determine neither of these antispasmodics makes any difference in the wax bulb-test.

FURTHER NOTES ON DISEASES OF THE UMBILICUS[1]

By Thomas S. Cullen, M.B.
Baltimore, Md.

Outline

Tetanus in the Newborn.
Granulation Tissue at the Umbilicus in the Newborn.
Umbilical Polyps of Omphalomesenteric Duct Origin.
Meckel's Diverticulum:
- (*a*) Gastric Mucosa in the Tip of
- (*b*) An Accessory Pancreas in the Tip of
- (*c*) A Pin Embedded in the Wall of
- (*d*) Sarcoma of

Umbilical Concretions Associated with Inflammatory Changes in the Abdominal Wall.
A Tuberculous Abscess Opening at the Umbilicus.
Probable Psoriasis at the Umbilicus.
Syphilitic Condyloma of the Umbilicus.
Bluish Discoloration of the Umbilicus as a Diagnostic Sign in Ruptured Extra-uterine Pregnancy.
Atheromatous Cysts of the Umbilicus.
Adenomyoma of the Umbilicus.
Nævus of the Umbilicus.
Moles of the Umbilicus.
Papilloma of the Umbilicus.
Pseudomucinous Cysts of the Umbilicus Secondary to a Pseudomucinous Cyst of the Ovary.
Carcinoma of the Umbilicus:
1. Primary Squamous-cell;
2. Secondary to Carcinoma of Stomach;
3. Secondary to Carcinoma of Intestine;
4. Secondary to Carcinoma of Rectum;
5. Secondary, Original Source Not Determined.

Sarcoma of the Umbilicus, Secondary.
Amnion Umbilicus.
Umbilical Hernia at Birth:
1. Uncomplicated;
2. Strangulated and Associated with Peritonitis.

A Satisfactory Method of Dealing with Intestinal Loops Densely Adherent to the Walls of an Umbilical Hernia.
Persistence of the Urachus.
Comment.

[1] From the Gynecological Department of the Johns Hopkins University and the Johns Hopkins Hospital.

SINCE the appearance of my book on diseases of the umbilicus,[1] six years ago, quite a number of American surgeons and pathologists have been good enough to draw my attention to cases coming under their notice, and quite a few have sent me the specimens for study.

During this period I have seen and operated on a goodly number of such cases. In the present paper I shall refer briefly to these cases, but shall not attempt to include the recent literature on the subject. To enter into a full discussion of the various lesions here considered would be a needless repetition, inasmuch as nearly all umbilical and urachal diseases are more or less fully analyzed in my book. Where necessary I shall, in a footnote, refer the reader to the page in the original volume where a full discussion of the given subject may be found.

TETANUS IN THE NEWBORN IN CHINA[2]

During the summer of 1916 Dr. Jennie M. Logan, who had just returned from China, visited Baltimore and we were discussing tetanus in the newborn. Her description of the appalling lack of asepsis during labor among the poor Chinese women of Hunan Province was so vivid that I asked her if she would not write me a short account of what she had actually witnessed there. Under date of October 11, 1916, Dr. Logan wrote from Boston, as follows:

> The usual preparation for lying-in by a poor Chinese woman in Hunan Province consists in getting together a roll of the cheapest paper made of straw, a large, old, low wash-tub about four or five inches deep, a small wooden stool six inches high to sit on in the tub, two shovelfuls of wood ashes wrapped in the straw paper for the bed, an old pair of scissors, a slop-bucket and a string.

[1] Cullen, Thomas S.: Embryology, Anatomy and Diseases of the Umbilicus, together with Diseases of the Urachus, W. B. Saunders Company, Philadelphia, 1916.

[2] Diseases of the Umbilicus, p. 95.

The mother sits on the stool, leaning against a friend or a washstand, the child is born into the tub, which already holds the amniotic fluid and previous discharge, and is caught up by the midwife or a neighbor; the cord is tied with any old string and the child rolled into the oldest, dirtiest garment the household affords. With such ushering into life it is small wonder that in our women's dispensary there are frequent cases of tetanus neonatorum. The person who brings the child generally tells us that the baby won't nurse. One finds the muscles convulsed, the little jaw rigid and the umbilicus either red or angry-looking or quite black and foul-smelling. The child is almost invariably about ten days old.

Just before the end of May a case came in, with the mouth open, though the jaws were perfectly rigid and could not be budged either to open or to close the mouth further. The hands too were not quite closed even during the convulsion, but were perfectly stiff.

We have had such cases for a period of eighteen years in the dispensary, and of late have not tried to help them in any way, as it always was hopeless and the attempt and failure did not help our work.

Dr. L. M. Miles, who soon goes to the gynecologic department of the Peking Medical School, and who has been working with me in the gynecologic department for the past year, has on several occasions spoken to me of the treatment of the umbilical cord in the part of China in which he has lived, and has drawn attention to the great frequency with which the newborn child develops tetanus. The reason why is clearly shown in the accompanying description. Under the heading "The Treatment of the Umbilical Cord and of the Newborn Babe in Shantung Province, China," Dr. Miles writes:

The people of Shantung Province of China are for the most part poverty-stricken. Hence they cannot afford even the simplest of layettes for the newborn babies. Cotton-cloth for diapers is out of the question because of cost. Consequently they have striven to find the cheapest possible substitute. This consists of a bag of coarse, native woven cotton-cloth, which fits the baby loosely and encloses it from the axillæ down.

Fig. A. Granulation tissue at the umbilicus in the new-born. (Gyn.-Path. No. 26463.)

Fig. B. An umbilical polyp. (C.H.I. No. 18780.)

Fig. C. Large indurated umbilicus with reddish tissue in its center. (Dr. Winslow's case.)

Fig. D. Nævus of the umbilicus. (Gyn.-Path. No. 24661.)

PLATE I.

Notes on Diseases of the Umbilicus.—Thomas S. Cullen.

As soon as the child is born the cord is tied with any old whisp of string and the baby is placed in this bag, which is then filled with dry dust from the field or street and the bag is then tied around the child's body. Under favorable circumstances the bag may be emptied and fresh dust substituted in a few days; in winter, when the ground is frozen, the dirt may merely be dried out over the fire and replaced in the bag.

Such a procedure is, as can well be imagined, often followed by tetanus neonatorum. It will be erring on the side of conservatism to say that 50 per cent of the babies thus cared for die within the first ten days of life.

Granulation Tissue at the Umbilicus in the Newborn[3]

In these cases the umbilical stump does not heal kindly. A small red mass is found in the umbilical depression, and from it there is usually a slight discharge of pus. When one examines the small red mass it is usually found to be flabby, but in the case shown in Plate I, *A*, it was unusually firm.

On microscopic examination these growths are found to consist of granulation tissue. The surface is covered with polymorphonuclear leukocytes. The outer layers are composed of granulation tissue and the central portion may be more or less organized (Fig. 1). Such small masses are totally devoid of epithelium.

Granulation Tissue at the Umbilicus in the Newborn. I saw C. W., a colored baby, one month old, at the Harriet Lane Home, on December 17, 1920. No abnormality at the umbilicus had been noted at birth. Two weeks before admission the child had had a three-hour crying spell and discharged a considerable amount of blood from the navel, and on examination the mother had noticed a small raspberry-like growth in the umbilical depression (Plate I, *A*). Since that time there had been a constant yellow discharge from the navel and the mother thought that the protrusion had become larger.

[3] Diseases of the Umbilicus, p. 116.

Operation. The small growth was gently lifted up with broad-pointed stomach clips and the base ligated with one plain catgut ligature. The growth was then cut away.

Gyn.-Path. No. 26463. The surface of the polyp is covered with polymorphonuclear leukocytes and fibrin. Beneath this is typical granulation tissue. The central portion of the polyp shows fairly well-organized connective tissue. At some points are areas of edema. Clinically, it bore a striking resemblance to an umbilical polyp due to remnants of the outer end of the omphalomesenteric duct. Histologically, however, no such similarity was found.

An Umbilical Polyp Consisting of Granulation Tissue. Surgical No. 46938. G. C., aged one month, was admitted to the Harriet Lane Home, on December 3, 1918. He had vomited occasionally since birth. The navel had never healed and protruded, especially when the child cried. There was some foul-smelling discharge coming from the umbilicus.

On examination a firm, lobulated, red, glistening, pedunculated tumor about 6 mm. in diameter was found projecting from the umbilical depression. The firmness of the tumor suggested an umbilical polyp due to the persistence of the outer end of the omphalomesenteric duct.

Operation, December 9, 1918. With intestinal clips I grasped the skin close to the umbilicus on each side to make the tissues taut. An elliptical incision was then made, and the umbilicus removed. The excision extended down to the peritoneum. The convalescence was uneventful.

Gyn.-Path. No. 24517. The surface of the polyp (Fig. 1) is covered by polymorphonuclear leukocytes. The superficial layers of the nodule are composed of typical granulation tissue, there being many young capillaries with young connective-tissue cells and polymorphonuclear leukocytes between them. The central portion of the polyp consists of connective tissue, rich in capillaries. Scattered throughout it are many young connective-tissue cells. Very few polymorphonuclear leukocytes are to be noted in the central portion of the polyp.

From the above it is clearly evident that the polyp consisted essentially of granulation tissue, no epithelial elements being present.

The squamous epithelium of the umbilicus showed some polymorphonuclear infiltration near the pedicle of the polyp.

It is unusual to find so firm an umbilical polyp unless it is due to a remnant of the omphalomesenteric duct. Where such is the case, little or no inflammation exists. The outer surface is covered by intestinal mucosa and the center contains strands of nonstriped muscle.

Clinically, this polyp bore a striking resemblance to a polyp of omphalomesenteric origin; histologically, however, no such similarity existed.

Umbilical Polyps of Omphalomesenteric Duct Origin[4]

Occasionally, when the cord comes away, a bright red polyp is noted in the umbilical depression. When this does not consist of granulation tissue, it is usually the remains of the outer end of the omphalomesenteric duct.

Granulation tissue usually soon dries up under astringent treatment, whereas the polyp consisting of embryonic remains persists.

Case C. H. I., No. 18780, is a notable example of the umbilical polyp originating from the omphalomesenteric duct. In Plate I, *B*, we see the bright red polyp welling out of the umbilicus and secreting a relatively clear fluid. Roughly the polyp resembles a cherry. It is 1 cm. in diameter. Near the middle is a roundish elevation. At this point a probe could be carried into the polyp for 8 mm. The growth was covered by a definite mucosa, which on histologic examination was found to be typical mucosa of the small bowel (Fig. 3). On the surface are a few drops of mucus and a large drop has just fallen off on to the abdomen. Fig. 2 shows that there is also a Meckel's diverticulum, which extends up to and is blended with the abdominal wall at the umbilicus.

[4] Diseases of the Umbilicus, p. 120.

This case came within an ace of being one of patent omphalomesenteric duct. Had this been true, fecal matter would have escaped from the umbilicus as soon as the cord came away. In some cases the polyp is the only remnant of the omphalomesenteric duct; in some the vessels of Meckel's diverticulum persist and are adherent to the abdominal wall; occasionally, the duct is patent and the polyp also exists. Cases of two remnants of the omphalomesenteric duct form a most interesting group.

Dr. Randolph Winslow's case bore much resemblance to the one here reported.

Dr. R. M. Harbin,[5] of Rome, Ga., in a short but interesting article published in 1917, reported several cases somewhat similar in character.

Umbilical Polyp Associated with a Meckel's Diverticulum. C. H. I., No. 18780. J. A., one year old, was admitted to the Church Home and Infirmary, March 30, 1918. This child had at the navel a bright red mass, about 1.5 cm. in diameter (Plate I, *B*). This was first noted when the cord came away. It was slightly lobulated and at one point a probe could be carried down for about 8 mm. In lifting up this mass it was found to be surrounded on all sides by normal skin which extended up over its surface for about 7 mm.

Operation. We made an elliptical incision which encircled the umbilicus and gradually cut down until we got to the peritoneum. The peritoneum was severed on all sides and we were able to raise the umbilicus with the tumor and the underlying tissue away from the abdominal wall (Fig. 2). When the umbilical tumor with the surrounding skin was lifted up, a loop of small bowel emerged through the umbilical opening and we found that we were dealing with an umbilical polyp firmly adherent to the umbilical depression and that this was continuous with a Meckel's diverticulum. We placed a purse-string suture around the base of Meckel's diverticulum exactly as in the case of an appendix operation. After severing the diverticulum with the cautery we turned in the stump and tied the purse-string. This was reinforced by three fine mattress sutures of

[5] Meckel's Diverticulum, with Special Reference to Umbilical Disorders of Infancy, Southern Med. Jour., February, 1917, p. 148.

FIG. 1.—An umbilical polyp consisting of granulation tissue. Surgical No. 46938. Gyn.-Path. No. 24517. The squamous epithelium of the umbilicus presents the usual appearance. Springing from the umbilicus by a delicate pedicle is a somewhat round polyp. Its surface was covered by polymorphonuclear leukocytes and the superficial layers of the nodule were composed of typical granulation tissue. The central part of the polyp consisted of connective tissue, rich in capillaries.

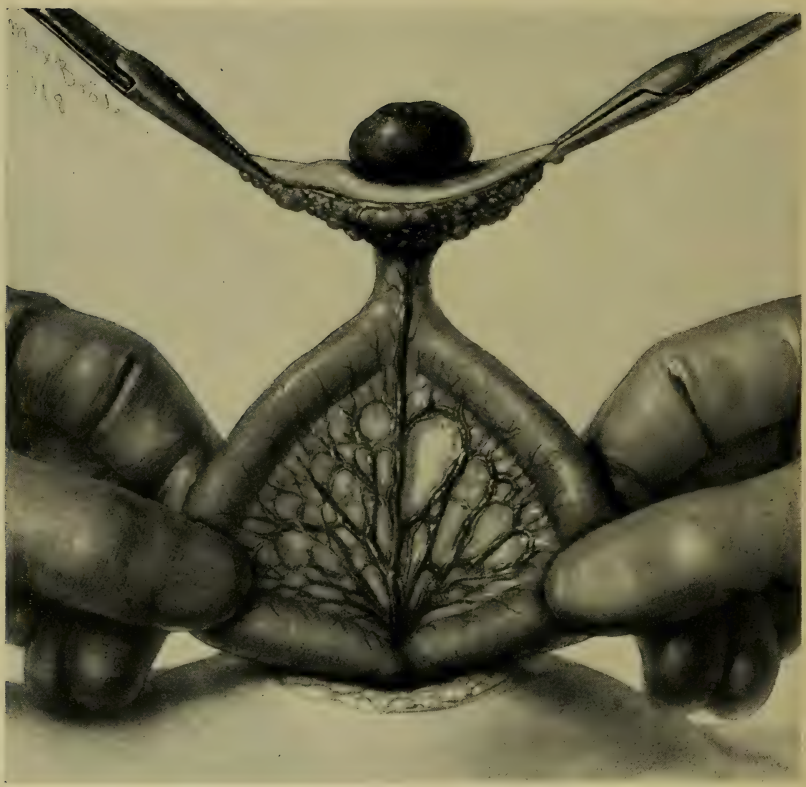


FIG. 2.—An umbilical polyp associated with a Meckel's diverticulum. H. I. C., No. 18780. An elliptical incision, including the umbilical polyp, has been made and the umbilicus lifted well away from the abdominal wall. Passing off from the loop of small bowel is a Meckel's diverticulum. This is firmly fixed to the inner surface of the umbilicus. Firmly attached to the outer surface of the umbilicus is the umbilical polyp. The small hole noted on the surface of the polyp, and into which a probe can be carried for 8 mm., is evidently the remnant of the lumen which formerly was continuous with Meckel's diverticulum. Both the omphalomesenteric artery and vein still persist. They pass from the mesentery of the small bowel over the surface of the bowel and along the diverticulum to the umbilicus. For the histologic picture of the umbilical polyp see Fig. 3.

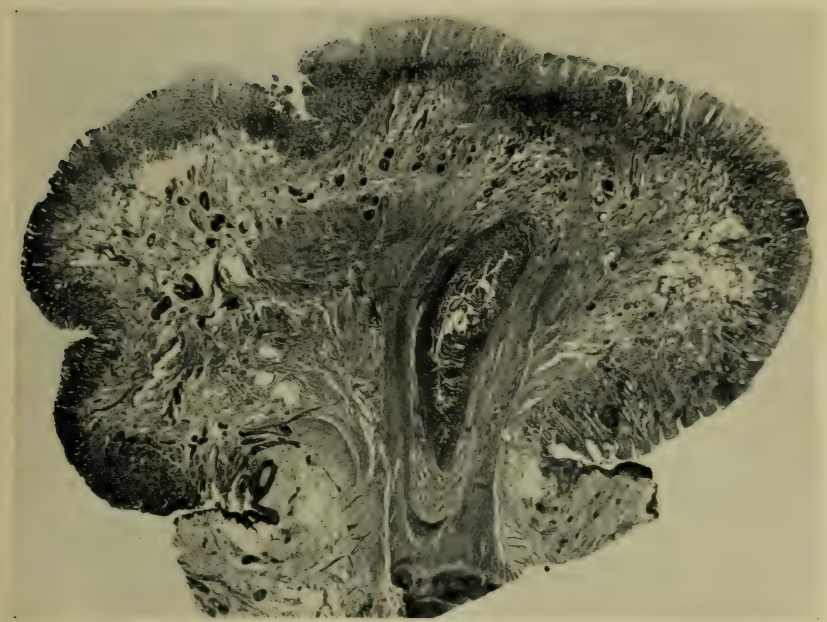


FIG. 3.—An umbilical polyp covered over by intestinal mucosa. C. H. I., No. 18780. From a section through the fiery-red polyp seen in Plate I, *B*. In this case a Meckel's diverticulum existed and was attached to the umbilicus (Fig. 2). In the lower part of the picture one sees the squamous epithelium. Covering the polyp is typical mucosa of the small bowel. In this case a probe could be carried down through the polyp for some distance. The cavity in the center of the polyp is formed by an oblique section of this fistulous tract. This tract also is lined with mucosa of the small bowel and represents the outer end of the omphalomesenteric duct. In the center of the polyp is much non-striped muscle, which encircles the fistulous tract.

black silk. The peritoneum and fascia were closed with two rows of mattress sutures of chromicized catgut, the adipose tissue was brought together with fine catgut and the skin with black silk. The child stood the operation well.

April 1. Last night the child's respirations became accelerated; it grew restless and the pulse became rapid. This morning the respirations were 60. After an enema the child had a small stool. Dr. Charles L. Summers made out a definite bronchopneumonia in the lower lobes of both lungs and a very unfavorable prognosis was given. The child died at 6 P.M.

At autopsy we found the bowel above the point of operation considerably distended, whereas below the point of attachment of Meckel's diverticulum it was somewhat contracted. The stump of Meckel's diverticulum that had been turned in had become congested and partly filled the lumen of the bowel. There was no fluid in the abdomen and no evidence of peritonitis. There was a definite bronchopneumonia in the lower lobes of both lungs.

In this case the bowel was very small, so small that when the stump of Meckel's diverticulum had been turned into it its lumen was considerably narrowed. We noted this carefully at operation, but the lumen apparently was still sufficient. Autopsy, however, showed that the inverted stump had swollen up after operation and almost completely blocked the bowel. In subsequent cases I should be inclined to leave little if any stump to the diverticulum, but cut it off almost flush with the lumen of the bowel and close this opening just as one would an ordinary linear incision in the gut, namely, with two rows of continuous silk, a very narrow margin of the gut being turned in, in view of the fact that the lumen is naturally so small in the young child. If closure be made transverse to the long axis of the bowel there will be less narrowing of the lumen.

A Meckel's Diverticulum Associated with an Umbilical Tumor (Dr. Randolph Winslow's Case). On April 1, 1918, Dr. Randolph Winslow sent me two pictures of a case which had come under his observation. In this small child the umbilical region

was represented by a large, indurated area in the center of which was reddish tissue. When the child lay in the dorsal position (Fig. 4 and projected drawing, Plate I, *C*) a marked prominence of the abdomen was apparent just below the umbilicus. Dr. Winslow said that in this case a Meckel's diverticulum was adherent to the indurated umbilicus. He removed the diverticulum and the umbilicus. In all probability the reddish area in the center of the umbilical depression was a remnant of the outer end of the omphalomesenteric duct.

Meckel's Diverticulum

In my book on *Diseases of the Umbilicus* I did not attempt to discuss abnormalities or diseases of Meckel's diverticulum with any degree of fulness, but confined my attention in the main to a consideration of those abnormalities of the diverticulum that were closely associated with lesions at the navel. However, as Meckel's diverticulum is the inner end of the omphalomesenteric duct, which in early embryonic life opens at the umbilicus, it is due some consideration.

(*a*) *Gastric Mucosa in the Tip of Meckel's Diverticulum.* Emil Goetsch,[6] in 1919, reported the case of a man, aged nineteen years, who had intestinal obstruction due to a Meckel's diverticulum which was adherent to the abdominal wall and to the omentum. The patient made a good recovery. Goetsch found the proximal end of the diverticulum lined with intestinal mucosa, but the distal portion for at least 1.5 cm. was lined with a mucosa totally different in character. This on histologic examination proved to be gastric mucosa. The case was most carefully studied from every standpoint and was well illustrated. Goetsch's paper should be read by everyone interested in the subject. Accompanying the article is a complete bibliography.

(*b*) *An Accessory Pancreas in the Tip of Meckel's Diverticulum.* Elsewhere[7] I referred briefly to a case reported by Bize, in which

[6] The Occurrence of Gastric Mucosa in a Case of Meckel's Diverticulum Producing Intestinal Obstruction, Johns Hopkins Hosp. Bull., 1919, xxx, 143.

[7] Diseases of the Umbilicus, p. 163.

an accessory pancreas was found in the tip of Meckel's diverticulum. In the literature accompanying Goetsch's article are references to quite a number of similar cases.

On April 1, 1920, Dr. Douglas Symmers, director of laboratories, Bellevue and Allied Hospitals, sent me a section from the tip of Meckel's diverticulum. This contained pancreatic tissue (Fig. 5). Dr. Symmers's letter is as follows:

I am sending to you under separate cover a section of an accessory pancreas removed from the tip of a Meckel's diverticulum of the small intestine, lying about 30 cm. above the ileocecal valve. The diverticulum measured about 6 cm. in length. The accessory pancreas lay at the extreme free end and was about the size of one's little finger-nail. On section it presented the typical naked-eye appearance of pancreatic tissue, and on microscopic examination you will observe that, in addition to ducts and acini, there are several islands of Langerhans. There are also several small nests of ganglion cells in the interstitial tissues of the gut.

(*c*) *Meckel's Diverticulum Containing an Ordinary Pin with its Head Buried in the Wall of the Diverticulum Near its Tip, the Point of the Pin Lying Free in the Lumen.* C. H. I., No. 27137. Frank C., aged twenty-two years, was sent to the Church Home and Infirmary by his physician, Dr. A. H. A. Mayer, on November 5, 1921. On November 4 this patient had a temperature of 105°. On the afternoon of the next day it was 104°, but by evening it had dropped to 102°. His leukocyte count was 50,000. He had definite pain beneath the costal margin on the right. A ruptured duodenal ulcer or an acute gall-bladder was at once suspected. The patient also had a definite friction rub over the lower right chest.

He was at once removed to the operating room and a right rectus incision was made. The liver extended down as far as the umbilicus, the gall-bladder was normal and the duodenum showed no change.

The appendix was drawn up and removed through the right rectus incision. It was much enlarged, injected and presented the characteristic picture of an acute inflammation.

When an attempt was made to pull the omentum up, it was

found intimately blended with what appeared to be a straight piece of bowel; in other words, a piece of intestine with no return loop. It was at once recognized as a Meckel's diverticulum. The omentum had grown fast to its entire tip, and at this point consisted almost entirely of fibrous tissue, being here practically devoid of fat.

A gridiron incision was made and the diverticulum drawn out through it and removed. The diverticulum was cut away close to the lumen of the bowel. The intestinal wall was closed with a through-and-through continuous mattress suture of catgut and then with a continuous black silk suture. Great care was taken not to narrow the lumen of the bowel. Nevertheless, when the opening was closed the lumen at this point was only two-thirds its natural size. I debated for some time whether to do a lateral anastomosis, but thought the bowel would surely take care of itself.

After operation the temperature still remained high, and from time to time the abdomen would become markedly distended. There was also a good deal of fecal vomiting. The stomach was washed out every few hours, and frequent enemata were given. Finally, the fecal vomiting stopped, but the marked distention still persisted. Dr. Thomas R. Boggs, who saw him with Dr. Mayer at this time, found definite signs of pneumonia at the angle of the scapula on the left side.

The abdominal distention became intense and on November 12 I made an enterostomy. We had no choice but were forced to take the first loop of distended small bowel that presented. It was evidently high up, as the abdominal wall had been much excoriated. From this time on the patient's general condition improved. Later on we closed the fistula. The patient is now perfectly well.

In future, after removing the diverticulum, if there is any appreciable narrowing of the bowel I shall make a lateral anastomosis, throwing the area of bowel with the stump of the diverticulum out of circuit.

Fig. 6 shows a pin embedded in the wall of the diverticulum, also the densely adherent omentum.

(*d*) *The Association of Malignant Myomata with Meckel's Diverticulum.* On April 15, 1919, Dr. Douglas Symmers,

FIG. 4.—A child with an abnormal umbilicus. Plate I, *C*, gives the appearance of the indurated umbilicus with the reddish area in the center. Below the umbilicus in the midline is a definite dome-like swelling. (Photograph sent to me by Dr. Randolph Winslow.)

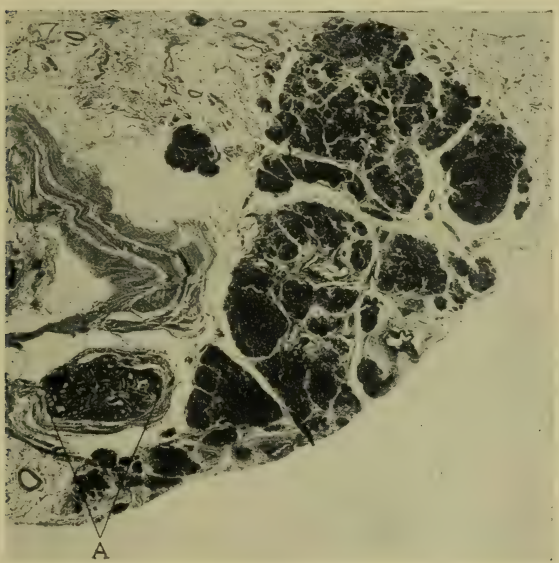


FIG. 5.—An accessory pancreas in the tip of Meckel's diverticulum. This is a very low-power photomicrograph of a portion of the tip of Meckel's diverticulum sent me by Dr. Douglas Symmers. The specimen is very thick and the picture is shown merely to give the reader an idea of the location of the pancreatic tissue. *A*, is the extreme tip of the diverticulum distal to the point where a lumen exists. All the other dark areas consist of pancreatic tissue.

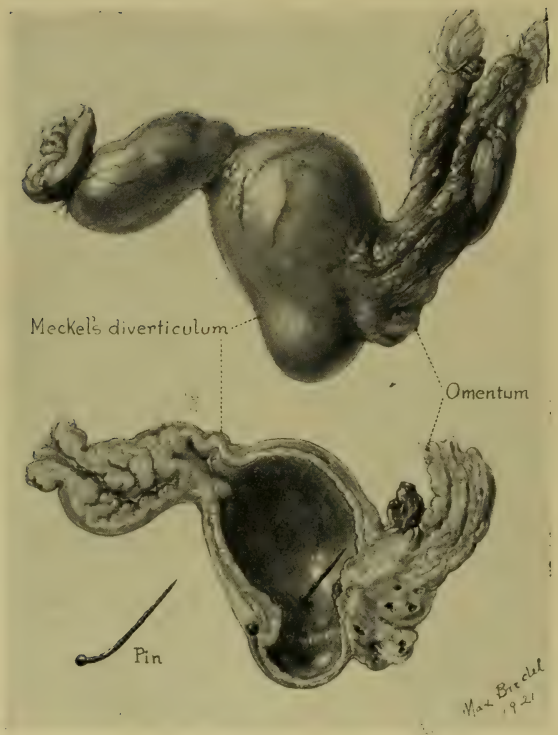


FIG. 6.—Meckel's diverticulum with a pin embedded in its wall and with the omentum densely adherent to the tip of the diverticulum. C. H. I., No. 27137. The specimen contracted markedly after removal. At the time of operation Meckel's diverticulum was of a uniform caliber for its entire length. In the upper picture we see that the omentum is intimately blended with the tip of the diverticulum. At this point all omental fat had disappeared. In the lower picture a pin is seen firmly embedded in the wall of the diverticulum. It was near the free point of the pin that the omentum had become so adherent.

director of laboratories of the Bellevue and Allied Hospitals, sent me slides from a tumor removed from a man, aged twenty-two years. This tumor had given rise to no symptoms and was accidentally discovered by Dr. Sweeny during an operation for hernia. The tumor was attached to the small intestine about 30 cm. from the ileocecal valve. Symmers said that the naked-eye appearances were those of a malignant tumor springing from the base of what appeared to be a Meckel's diverticulum. Histologically, it suggested a myoma of the uterus undergoing sarcomatous transformation.

Symmers[8] reported this case in the summer of 1919: He says:

For purposes of description, the specimen is divisible into two parts—an upper, rounded and elastic to the touch, and a lower solid portion. On opening the upper part it was found to consist of a pouch-like formation, lined on the inner side by a roughened, dirty-brownish, apparently structureless membrane. The lower portion consisted of a firm, whitish or cream-colored, irregularly lobulated growth, which completely encircled the base of the pouch-like dilatation by which it was surmounted, lobular prolongations from the growth extending upward into the walls of the diverticulum and gradually disappearing therein. On opening the mass it was found that the walls of the diverticulum merged imperceptibly into a cuff-like tube, the lining of which was thrown into small transverse folds of apparently well-preserved mucous membrane. Projecting into the lumen of this portion of the intestine was a large, pale, firm, whitish tumor, covering the surface of which was a delicate membrane continuous with and presenting the same naked-eye appearances as the cuff of intestine by which the projection was surrounded. Externally the loop of intestine was reinforced by an irregularly lobulated growth, which, on section, presented a smooth, pale surface, where, at intervals, were reddish specks corresponding to injected blood sinuses.

An excellent picture of the gross appearance of the tumor accompanied Symmers's article. Symmers further says:

[8] The Association of Malignant Myomata with Meckel's Diverticulum, Ann. Surg., August, 1919, p. 183.

I have been able to find but one case of like origin in the literature of medicine; that is to say, a malignant myoma or so-called myosarcoma of Meckel's diverticulum.

He then cites the case observed by Kaufmann.

Symmers's conclusions are so instructive that I quote them in detail from the *Annals of Surgery:*

1. Subserous, occasionally submucous, leiomyomata are encountered in the walls of the stomach, intestine or gall-bladder, in less than 1 per cent of autopsies. As a rule, they are solitary, rarely multiple. Seldom do they exceed 1 cm. in diameter.

2. Judging from the small number of cases to be found in the literature of malignant myomata of the stomach, intestine and gall-bladder, and comparing this with the number of subserous or submucous leiomyomata met with in corresponding situations in the routine performance of autopsies, the assumption seems reasonably justified that these apparently insignificant growths undergo transformation into malignant myomata with a degree of frequency which entitles them to attention as a potential source of danger. If accidentally encountered at operation they should, I think, be removed.

3. The majority of malignant myomata of the stomach, intestines and gall-bladder thus far reported were found in organs which otherwise appeared to be intact. In other and rare instances, however, these malignant growths bear a definite anatomic relationship to the developmental malformation of the intestine familiarly known as Meckel's diverticulum.

4. The malignant myomata of the stomach, gall-bladder and intestine, including those associated with Meckel's diverticulum, are capable not only of extensive local expansion, but of widespread metastasis. Their degree of malignancy is apparently in excess of their prototype, the malignant myomata developing from smooth muscle tumors of the uterus.

Umbilical Concretions Associated with Inflammatory Changes in the Abdominal Wall[9]

Many cases of umbilical infection owe their origin to an accumulation of foreign material in the umbilical depression.

[9] Diseases of the Umbilicus, p. 247.

This causes irritation, the walls of the umbilicus swell and the umbilical opening then may apparently be of pin-point size. The clinical manifestations may, as in the following case, simulate an intra-abdominal lesion, whereas the process is extra-abdominal and limited to the umbilical area.

When an umbilical concretion is the cause of the trouble, it is merely necessary to dilate the umbilicus, curette away the concretion, remove any granulation tissue that may exist, and then treat the umbilical area as one would any other superficial infection. Umbilical infections form a most instructive group. In most cases concretions are responsible for the condition.

An Infection of the Umbilicus. Gyn. No. 21917. W. D., aged twenty years, white, was admitted to the Johns Hopkins Hospital, January 6, 1916, complaining of an infection of the umbilicus and of pain in the lower abdomen.

Five years previously she had begun to have attacks of pain in the left lower abdomen. These would last for three or four days and were associated with some soreness and swelling in that region.

In January, 1913, the patient had a severe fall and injured her left side. The pain then grew worse, and in August of the same year was present in both the right and left lower abdomen.

On August 15, 1915, she had an attack of appendicitis, and on the following day experienced a burning sensation to the left of the navel which, after two days, became associated with some swelling at this point. The swelling at first was smooth, but in a few days became soft and fluctuant in the center, while around the softened area was a ring of hard indurated tissue. The lump to the left of the umbilicus became larger, and on October 23 it ruptured, discharging a small amount of blood into the umbilical depression. Blood oozed out for two weeks. A week later the area began to burn and sting, and for the next three weeks there was a bloody and purulent discharge from the umbilicus. At the end of this time the swelling began to spread and the umbilical region over an area as large as a saucer was indurated and discharged pus continuously. There was some fever. The pus gradually became thick and greenish. The discharge was of this character when the patient entered the hospital and for several weeks she had had chills and fever.

On her admission to the hospital an ulcerated area 5 cm. in diameter was found at the umbilicus. This presented a crusty, reddish-yellow, scab-like appearance and entirely obliterated the normal umbilicus. Surrounding this was a zone of induration. The abdomen was everywhere tender, especially in the right lower quadrant. The outlet was normal, the cervix small, and the uterus larger than normal and in retroposition. The fornices were clear. The white blood count was 8400; hemoglobin, 83 per cent.

Operation, January 10, 1916. Under nitrous oxide anesthesia I dilated the infected umbilicus with a Kelly clamp and a small amount of infected tissue was removed. The wound was dressed twice a day with iodin, and on January 23 alcohol sponges were applied. At this time there was no induration of the abdominal wall.

Second operation, February 19, 1916. The cervix was dilated, the uterus was brought up into position, and the appendix was removed.

When the patient left the hospital on March 10, 1916, the umbilicus had the normal appearance but the surrounding skin was still somewhat discolored.

Gyn.-Path. No. 21812. The specimen consists of three small pieces of tissue removed from the umbilicus.

Histologic Examination. Bathing the umbilical cavity was purulent material, beneath which was a thin layer of granulation tissue containing young connective-tissue cells and polymorphonuclear leukocytes. Few capillaries were noted. This granulation tissue extended down for a short distance into the fibrous tissue as slender strands.

It will be noted that in this case we merely dilated the umbilicus and curetted away some inflammatory tissue. The chief thing was the stretching of the constricted umbilical opening so that the discharge could escape.

The subsequent abdominal operation revealed the fact that the inflammatory process had been confined entirely to the abdominal wall, the center of intensity being at the umbilicus itself.

A Tuberculous Abscess Opening at the Umbilicus

Elsewhere I have described the subumbilical space[10] and referred to abscesses that may develop in this situation.

The following case suggested somewhat an ordinary abscess at this point, but the history and subsequent findings clearly indicate that the tubercle bacillus was at the bottom of the trouble. There was later probably a mixed infection.

I have reviewed the literature on tuberculous peritonitis followed by fecal fistula at the umbilicus,[11] but in the accompanying case there was no escape of fecal matter, and we were greatly surprised to find tuberculous peritonitis at operation.

We shall naturally find a tuberculous umbilical fecal fistula only in the late stages of tuberculous peritonitis, and then only when the intestine is extensively involved and has become adherent at the navel.

Gyn. No. 25386. G. T., aged twenty-five years, was admitted to the Johns Hopkins Hospital on October 17, 1919, complaining of a discharge from the navel.

She became pregnant in May, 1918, and got along nicely until January, 1919, when she had pain in the right lower abdomen. She was delivered in February and nursed her baby for a while. She had some fever, occasional nightsweats and felt bad.

On February 20, 1919, some swelling of the abdomen was noted, and on March 6 an umbilical abscess ruptured.

When the patient entered the hospital there was slight abdominal distention, and exuding from the umbilicus was a greenish-gray, foul-smelling pus. Two inches above the umbilicus was an area of induration 4 cm. in diameter. Pressure on this caused pus to escape from the umbilicus.

Operation, October 20, 1919. With a pair of Kelly forceps in the umbilical sinus, as a guide, I made an incision downward toward the symphysis, opening up an abscess cavity 6 cm. wide and 4 cm. deep. This cavity was packed with iodoform gauze

[10] Diseases of the Umbilicus, p. 262.

[11] Ibid., p. 314.

and the abdominal incision partially brought together. The drainage gradually decreased and the cavity was from time to time irrigated with Dakin's solution. When she left the hospital on November 12, 1919, there was still induration around the umbilicus and a profuse discharge. From time to time the patient returned for dilatation of the sinus.

Gyn. No. 25666. The patient was readmitted on January 27, 1920. At this time there was a seropurulent discharge from the umbilicus and thickening could be made out in the right vaginal fornix.

Operation, February 2, 1920. I excised the umbilical sinus, carefully walled off the intestines, removed the appendix, the tubes and the left ovary.

Path. No. 25714. The appendix showed chronic inflammation. The fistulous tract was tuberculous. There was also tuberculosis of the tubes and of the left ovary. Tubercles were also scattered throughout the abdomen.

Probable Psoriasis of the Umbilicus

This patient had a patch resembling psoriasis on his forehead and a similar area on the umbilicus. There is no reason why the navel should be exempt from psoriasis if there are lesions elsewhere, but we have never noted it in this location before. This patient had appendicitis, and, as he was bothered by the umbilical discharge, we removed the umbilical area at the same time.

Mr. C. P. K., aged forty years, was referred to me by Dr. Charles L. Warner and admitted to the Church Home and Infirmary, March 4, 1921. He had definite symptoms of chronic appendicitis and also complained of a periodic discharge from the navel.

On examination I found a reddening around the edge of the umbilicus, particularly in the lower portion, over an area 1 cm. long and 1.5 cm. broad (Fig. 7). It was thought that this reddened area might in some way be associated with a patch of psoriasis that the patient had on the forehead just at the junction of the hair.

Operation. We removed the umbilicus and found the peritoneal surface at this point perfectly smooth. The appendix

was removed and the small bowel carefully examined to see if by chance a Meckel's diverticulum existed.

Gyn.-Path. No. 26644. Sections from the outlying portions of the umbilicus show normal epithelium. As we approach the reddened area the papillæ become longer, in some places reaching the surface, and at a few points project right through the epithelial covering. In the neighborhood of such points the epithelium, which appears horny and shows slight infiltration with small round cells, may be piled up as little elevations. The stroma immediately beneath the squamous epithelium in these areas is in places rarefied. There are young capillaries in such areas and they are surrounded by small round cells. In other places there are large aggregations of these small round cells in the stroma just beneath the epithelium.

It is quite possible that the red area at the umbilicus was identical with that noted on the forehead just at the junction of the hair. The clinical diagnosis of the area of redness on the forehead was psoriasis.

Syphilitic Condyloma of the Umbilicus

Syphilis of the umbilicus is rare. It is divided into two groups: Syphilis of the umbilicus at or shortly after birth, and syphilis of the umbilicus in the adult.

One of the most interesting cases of syphilis of the umbilicus in the adult ever noted was the one observed by Fiaschi, of Sydney, Australia. I have described this case in detail elsewhere.[12] In addition to the primary chancre on the prepuce there was a chancre at the umbilicus. The photograph of the umbilicus showed several dome-like elevations projecting from the floor of the navel, and trickling down the abdomen from the navel was a watery fluid. Spirochetæ were obtained from the umbilicus.

In November, 1916, I saw an interesting case of syphilitic condyloma of the umbilicus, with Dr. A. G. Rytina,[13] at the

[12] Diseases of the Umbilicus, p. 284.

[13] Condyloma of the Umbilicus, Am. Jour. Syphilis, January, 1918, vol. ii.

Mercy Hospital, Baltimore. The history, as given by Dr. Rytina, is as follows:

November 16, 1916. F. F., white, male, steelworker, complains of sores around the anus. He has been in good health all his life. No previous venereal diseases, except a sore on the penis eight weeks ago, the incubation period of which was nine days. The sore healed in a month under local treatment.

Present Condition. About five weeks ago the patient noticed a severe itching around the anus. This was followed in several days by the appearance of a number of sores, which gradually became larger and more painful. During the past two weeks a warty mass has appeared around the anus. This is so painful and uncomfortable that the patient has no rest. During the past day or two the patient has had a burning and itching sensation in the umbilical region. This he attributes to an elastic belt which he wore and which rose to the level of his navel. He also complains of a sore throat and a sore on the inside of the lower lip.

Examination reveals the external genitals normal except for the presence of a small elevation on the right lip of the meatus and an indurated area on the left side of the penis near the frenum. Both these places are the remains of the original sites of infection, which were evidently two in number. No examination of these for Spirocheta pallida had been made before they healed. The inguinal glands of both sides are enlarged and painless. Surrounding the anus there is a ring of condylomata which, on microscopic examination, shows many Spirochetæ pallidæ. A faint macular rash can be seen over the body. The right tonsil is covered by a mucous patch and a patch is seen on the inner side of the lower lip. A cervical adenitis is present also.

Inspection of the umbilicus shows a slightly reddened area around it. On everting the umbilicus, three distinct, typical condylomata are seen. Microscopic examination shows many Spirochetæ pallidæ.

Treatment. The patient was given four intravenous injections of salvarsan to 0.3 gm. each, at weekly interval. On December 4 there was slight itching around the anus, but the pain had disappeared. The condylomata of the umbilicus were drying up. On December 12 the condylomata of the anus were almost dried up and no longer caused discomfort. The condylomata of the umbilicus were dry and smaller. At present the lesions have all cleared up.

Fig. 7.—Probable psoriasis of the umbilicus. Gyn.-Path. No. 26644. The irregular dark area occupying about half of the lower margin of the umbilicus was reddish in color and was very similar to a patch on the patient's forehead. There was just a trace of a similar condition on the upper portion of the umbilicus. From the text it will be noted that many of the papillæ in the reddened area were unusually long and projected through the epithelium. The epithelium itself was here and there gathered up into little tufts. These tufts consisted of dead epithelium. The stroma just beneath the epithelium, especially around the capillaries, showed much small round-cell infiltration.

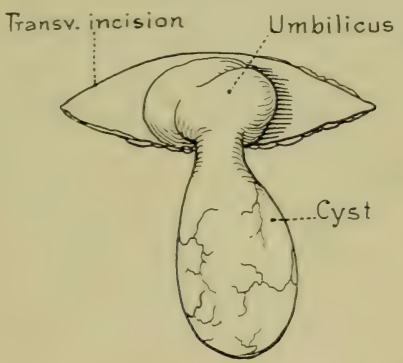


Fig. 8.—An atheromatous cyst of the umbilicus. This is a copy of the sketch made by Dr. Edwin Dargan Smith, of Louisville, Ky., prior to his removal of the umbilical cyst. It was pear-shaped, measured 2 by 3 cm. and was pedunculated. The overlying skin was thinned out and had branching bloodvessels scattered over its surface. The cyst was filled with a pasty, pale, granular and rather dry material.

Fig. 9.—A small umbilical nævus. C. H. I., No. 20561. Gyn.Path. No. 24661. This is a section of the small reddish-blue nævus seen in Plate I. *D*. The squamous epithelium is somewhat thinned out. The bloodvessels of the nævus are large, have very thin walls and many of them have little or no intervening stroma.

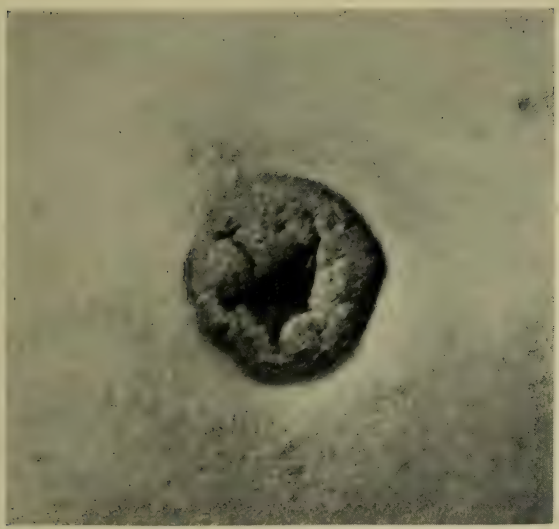


FIG. 10.—Papilloma of the umbilicus. This photograph, together with a slide, was sent me by Dr. N. B. Carson, of the Barnard Free Skin and Cancer Hospital, of St. Louis, Mo. St. Louis No. S15165. The entire umbilicus is involved in the papillomatous growth, which extends well above the surface of the abdomen. At some points it is wider than at others. The surfaces of the papillary masses were covered by many layers of squamous epithelium, the superficial layers of which were hornified. Here and there, between epithelial cells, were polymorphonuclear leukocytes, many of them eosinophilic. Immediately beneath the epithelium there was a very active inflammatory reaction, young connective-tissue cells, small round cells, and polymorphonuclear leukocytes being present. Beneath this, again, was the characteristic stroma of the part. There was no evidence of malignancy. This is the first specimen of this kind that I have ever seen.

Dr. Rytina, in summing up the essential points in the case, says:

The most interesting feature of the case is the wearing of the belt around the umbilicus, the irritant action of which was undoubtedly the predisposing factor in the production of the lesion. The diagnosis of the lesion was easily made by its typicalness, being exactly similar to the condylomata ani which the patient also had. The certainty of its luetic nature was demonstrated by the presence of the Spirocheta pallida and its rapid disappearance after the institution of antisyphilitic treatment.

Bluish Discoloration of the Umbilicus as a Diagnostic Sign in Ruptured Extrauterine Pregnancy

In 1919[14], I reported, and Max Broedel illustrated, a new sign that may prove of value in the diagnosis of some tubal pregnancies where the abdomen contains an abundant quantity of free blood. If the hemorrhage has been a sharp and severe one the clinical symptoms are so evident that operation is at once undertaken. But occasionally the bleeding has evidently been slow but persistent. In such cases the abdomen may accumulate a large quantity of blood without the patient having given any evidence of shock. In such a case the umbilicus may in some manner imbibe the blood and appear bluish black, so that in time we get the same play of colors at the umbilicus that one does with a black eye—the greens and yellows.

On March 21, 1918, there entered the Church Home and Infirmary a thin, wiry woman (C. H. I., No. 18744), who looked to be nearly sixty years of age, but who was actually only thirty-

[14] Cullen, Thomas S.: Bluish Discoloration of the Umbilicus, etc., Contributions to Medical and Biologic Research, dedicated to Sir William Osler, in honor of his Seventieth Birthday, July 12, 1919, by his Pupils and Co-workers.

eight. She was the mother of seven children. For three weeks she had had pain in the right lower abdomen, with intermittent attacks of abdominal distention. One week after the onset of the trouble the umbilical region suddenly became bluish-black, although there had been no injury in this region. Pelvic examination was very unsatisfactory on account of the marked abdominal distention.

Operation. March 27, 1918. With the patient asleep the uterus was found to be slightly enlarged. To the right of the uterus was a freely movable mass, about 8 cm. long by 5 cm. broad.

Prior to opening the abdomen I dictated the following note: "The bluish-black appearance at the navel unassociated with any history of injury, together with the mass to the right of the uterus, makes the diagnosis of extrauterine pregnancy relatively certain, although the patient has not missed any period and although there has been no uterine bleeding."

On opening the abdomen I found it filled with dark blood, and attached to the fimbriated end of the right tube was an extrauterine pregnancy. It was possible to remove this without sacrificing the tube.

The bluish discoloration gradually diminished in intensity during the patient's sojourn in the hospital prior to operation, and disappeared completely within a few days after operation. The gradual change in color that took place in the umbilical region reminded one strikingly of the changes in color that occur in a black eye resulting from a blow.

I recorded this case in order that subsequent ruptured extrauterine pregnancies may be examined for this sign. Whether it will prove to be of common occurrence or very rare I cannot say, but we shall naturally expect it only where there is free blood in the abdomen, and shall probably be more likely to encounter it in thin individuals.

Dr. Emil Novak, who is associated with me in our laboratory work, has recently had two cases presenting this sign. These he reported in the *Journal of the American Medical Association,* 1922, lxxviii, 643. Recently a similar case has been recorded in the *Centralblatt für Gynäkologie.*

Atheromatous Cysts of the Umbilicus

In a survey of the literature[15] I noted six genuine instances of atheromatous cysts of the umbilicus. The major portion of those reported seemed to be cases of umbilical infections with concretions and not atheromatous or dermoid cysts.

During the last five years I have observed 3 cases, 1 at the Johns Hopkins Hospital; Dr. H. H. Hampton, then resident surgeon at the Hebrew Hospital, removed the second; and the specimen of the third case was sent me by Dr. Edwin Dargan Smith, of Louisville, Ky. In Dr. Hampton's and also in Dr. Smith's case the condition was noted at or shortly after birth. In our case no mention was made of any umbilical trouble until the patient was eighteen years old.

These tumors may spring from the umbilical depression or from the wall of the umbilicus; they are usually pedunculated, may reach 3 cm. or more in diameter, are covered with skin, are usually flaccid, are thin-walled, have smooth inner surfaces, and are filled with grumous or crumbly material.

They are lined with a more or less well-developed squamous epithelium, and are devoid of hairs and sebaceous and sweat glands.

Histologic examination of the cyst contents shows exfoliated squamous epithelium, fat droplets and frequently cholesterin crystals. These crystals are easily removed.

In the Emmett operation for perineal repair a wide removal of the vaginal mucosa is made. Occasionally a small piece of vaginal mucous membrane has been overlooked, and when the parts were approximated this has been carried into the depth of the perineum. This in time may form a small cyst filled with grumous material. I have pictured a vaginal cyst of this character.[16]

[15] Diseases of the Umbilicus, p. 366.

[16] Cullen, Thomas S.: Vaginal Cysts, Johns Hopkins Hosp. Bull., 1905, p. 211 (Figs. 8 and 9).

Similar cysts undoubtedly occasionally occur where a small loose piece of vaginal mucosa is accidentally buried when the perineal repair is done immediately after labor.

We are thoroughly familiar with the remnants of the omphalomesenteric duct that are not infrequently noted at the navel, and with the gradual closing in of the abdominal walls, finally culminating in the formation of the umbilicus. It is quite possible that a small piece of attenuated skin of the umbilical scar might become buried in this region. This would very naturally in time produce a small atheromatous cyst.

An Atheromatous Cyst of the Umbilicus. Gyn. No. 21957. E. T., aged twenty years, entered the Johns Hopkins Hospital, March 20, 1916, complaining of backache and of pain in the lower abdomen. For two years she had had occasional attacks of abdominal pain, usually near the umbilicus and radiating to the flanks.

Protruding from the umbilicus was a rounded, lobulated, soft tumor about 3 by 1.5 cm. This sprang from the umbilical depression and from the abdominal wall directly below it, by a delicate pedicle. Dr. Kelly removed the umbilicus together with the cyst.

Gyn.-Path. No. 22003. The specimen consists of an oval piece of skin containing in its center the umbilicus. Arising from the lower margin of the umbilicus by a pedicle 1 cm. in diameter is a cyst 3.5 cm. in diameter. This is covered by skin. It contains sebaceous-like material.

Even without a microscopic examination the specimen presents the typical picture of an atheromatous cyst of the umbilicus.

An Atheromatous Cyst of the Umbilicus. On November 1, 1917, M. S., a small boy, entered the Hebrew Hospital and came under the care of Dr. H. H. Hampton, who sent me the specimen and the history of the case.

This boy, since birth, had had a small tumor which hung down from the umbilicus by a well-defined pedicle. The tumor was soft, had a semisolid consistency, and apparently had altered little in size for a considerable period.

Operation by Dr. Hampton. The cyst was readily removed. There was apparently no direct connection between it and the peritoneal cavity.

Gyn.-Path. No. 23463. The tumor is whitish in color, is oval, measures 3.4 by 2.7 by 1.7 cm., and is definitely cystic. Its walls vary from 0.5 to 1 mm. in thickness. When a small hole was made in it a sebaceous-like material escaped.

No perfectly satisfactory sections of the cyst could be obtained, as the tissue was very brittle and did not cut well. The walls were composed of connective tissue, poor in nuclei. The inner surface of the cyst was lined with an imperfect squamous epithelium. The deep layer was cuboidal, and superimposed on it were five or six layers of ill-defined squamous epithelial cells.

The growth was evidently an atheromatous cyst.

An Atheromatous Cyst of the Umbilicus. Dr. Edwin Dargan Smith, of Louisville, Ky., on November 21, 1918, sent me a report of an interesting umbilical cyst he had recently removed, together with portions of the specimen:

The patient, a schoolboy of eleven years, came under Dr. Smith's care on November 7, 1918. A few weeks after birth a small growth appeared at the umbilicus. The tumor grew only slowly until six years ago, but after that gradually increased in size. It was covered with skin, had the consistency of a lipoma, was pear-shaped, measured approximately 2 by 3 cm. and was attached to the umbilicus by a pedicle measuring about 3 by 8 mm. The overlying skin was thinned out, had small branching bloodvessels scattered through it and would slide readily over the growth (Fig. 8). There was no pain referable to the umbilicus.

Operation, November 8, 1918. A transverse incision was made embracing the umbilicus, as in the Mayo operation, and the umbilicus removed. The inner surface of the navel was perfectly smooth. The appendix was removed and a slight physiologic intussusception was easily reduced. The boy was discharged November 17.

Dr. Stuart Graves, pathologist of the Louisville City Hospital, found that the cyst contained a cavity 1 cm. in diameter. It was filled with a pasty, pale, granular and rather dry material. This material under high power was found to be crystalline in nature. It dissolved in a mixture of absolute alcohol and ether. Dr. Graves found it impossible to get satisfactory sections of the cyst wall, and we had the same trouble.

The cyst was lined with what looked like an embryonic epithelium, apparently of the squamous-cell type. In some places this was two or more layers in thickness. The nuclei were oval and vesicular, but the individual cells were not well differentiated. At other points there was a well-defined squamous epithelium several layers thick and covering the surface of this was what appeared to be an ill-defined horny epithelium.

Undoubtedly this was a small atheromatous cyst of the navel.

Adenomyoma of the Umbilicus

Adenomyoma of the umbilicus is a definite clinical entity. Elsewhere[17] I have considered the subject fully and have discussed the literature. These growths naturally occur only in women. They are small, occasionally swell up at the menstrual period, and sometimes cause a slight escape of blood from the umbilicus during the period. Histologically they consist of nonstriped muscle and fibrous tissue, with uterine mucosa scattered here and there throughout the nodule.

Recently two further cases have come under my notice. These were published in detail in the *Archives of Surgery*, 1920, i, 279.

Small Nævus or Hemangioma of the Umbilicus

Small nævi of the skin are relatively common, but in only one instance have I ever noticed a nævus at the umbilicus. Histologically it was similar to those found in the skin. Under ordinary circumstances no attention would have been paid to it, but the patient worried about its presence, and as he had some discharge from the umbilicus we removed the entire umbilical area.

C. H. I., No. 20561. H. E. S., aged fifty years, was admitted to the Church Home and Infirmary early in January, 1919.

[17] Diseases of the Umbilicus, p. 373.

He was perfectly well, except that he complained of some discharge from the navel. The umbilical mamelon projected somewhat, and springing from its surface was a small, bluish-red nodule about 3 mm. in diameter (Plate I, *D*). This seemed to be a nævus.

Operation, January 14, 1919. As the umbilical discharge worried the patient considerably, we thought it wiser to remove the area. This was done. The wound healed by first intention.

Gyn.-Path. No. 24661. The squamous epithelium over the small, bluish-red mass is only two or three layers in thickness. Immediately beneath this is a narrow zone of fibrous tissue; beneath this, again, are large quantities of bloodvessels lined with one layer of endothelium, and often lying one against the other with no intervening stroma (Fig. 9). If the blood were removed the spaces with the delicate intervening stroma would bear a striking resemblance to lung tissue. The line of demarcation between the bloodvessels and the underlying fibrous tissue is sharply defined.

The picture is that of an angioma. Clinically, it is of little significance. Histologically it is very interesting.

Moles of the Umbilicus

On one or two occasions I have noted small pigmented moles in the umbilical depression or along its side. Dr. Leo Brady, resident gynecologist, Johns Hopkins Hospital, has also noted them. They have occasioned no trouble.

Papilloma of the Umbilicus

The literature on this subject I have collected and published in my *Diseases of the Umbilicus*, p. 360.

On September 20, 1916, Dr. N. B. Carson, of the Barnard Free Skin and Cancer Hospital, St. Louis, Mo., sent me a photograph and slides of a papilloma of the umbilicus. This case was published in the *Annals of Surgery*, February, 1917, p. 199.

The patient, A. C., male, white, aged seventy-seven years, was admitted to the hospital on October 25, 1915. He had

always done outdoor work, gave no history of lues, and, apart from one attack of jaundice several years before, had always been in good health.

About a year before admission the patient noticed a small mass the size of a "dime" at the umbilicus. There had been no history of injury. The mass never ulcerated and occasioned little pain. Recently it had increased in size.

On admission the picture presented in Fig. 10 was found. At the umbilicus was a hard, irregular, indurated mass surrounding the umbilical opening. There was no ulceration. The growth appeared to extend deeply, but did not seem to invade the surrounding tissue. Dr. Carson said that there was no evidence of hernia or of any abdominal masses. The liver was about four fingers' breadth below the costal margin. Examination of the rectum was negative.

Operation. Under 1 per cent novocain an elliptical incision about 5 cm. in length, including the tumor, was made across the abdomen and carried down to the peritoneum. The tumor did not extend into the abdomen, but seemed to be limited to the umbilicus. The omentum was, however, adherent at this point. Exploration of the abdomen failed to reveal anything abnormal. The patient made an uneventful recovery.

Dr. Carson said: "The tissue consists of an elliptical piece of skin 4 by 8 cm., which surrounds a papillomatous growth, 2 by 2 cm. The surface of the growth is irregular, not ulcerated, and the growth extends down along the umbilical tract. It seems to be fairly well encapsulated. It does not seem to invade the surrounding tissue."

On examination of the slides kindly sent to me by Dr. Carson, I found that the growth was a papilloma. The papillary masses were everywhere covered over by many layers of squamous epithelium, the superficial portions of which were hornified. Scattered here and there between the epithelial cells were small round cells or polymorphonuclear leukocytes, many of which were eosinophiles. The connective tissue immediately beneath the epithelium showed a very active inflammatory reaction, young connective-tissue cells, small round cells and polymorphonuclear leukocytes being present. The central stems of the papillary masses consisted of fibrous tissue.

The picture is that of a typical papilloma springing from the squamous epithelium.

Small Umbilical Cysts Secondary to a Pseudomucinous Cyst of the Ovary

By some, pseudomucinous cysts of the ovary are looked upon as benign, by others as malignant. I think if we take a position midway between these two views we shall be nearer the mark.

When we follow the clinical course of these cases, we note that in some there is a rapid return of the growth; in others, years may elapse before a second operation is necessary.

In the following case, at the time of operation, several small pseudomucinous cysts were found at the umbilicus. Histologically these were identical in character with the large ovarian tumor.

This is the only instance, so far as I know, where a pseudomucinous cyst of the ovary was accompanied by umbilical cysts of the same type. They were, of course, secondary.

C. H. I., No. 19252. Mrs. M. D., of Knoxville, Tenn., came to see me on May 27, 1918, complaining of marked abdominal enlargement.

She had never had any children. Her menses had ceased suddenly at the time of the Baltimore fire (1904) and never reappeared. She was thirty-seven years old at that time. In 1900 she had had peritonitis and was ill seven weeks. Her abdominal enlargement dated back about two months. For the last two weeks she had had a bronchitis.

The abdomen was uniformly and markedly distended and there was a most unusual picture at the navel (Fig. 11). The upper part of the umbilical rim had been replaced by a small cyst, on the top of which was a second cyst, and projecting from the umbilical depression there appeared to be a third cyst. Pelvic examination was unsatisfactory, as the abdominal growth seemed to have pulled the pelvic structures up into the abdomen.

Operation, June 4, 1918. On opening the abdomen we found quantities of free colloid material. This was removed as far as feasible. We then took away a large pseudomucinous cyst of the right ovary. The appendix was twice the natural size and

also thickened. The peritoneal surface of the umbilicus was perfectly smooth. The patient's recovery was uneventful.

May 2, 1921. Mrs. D. came to see me today—"Dropped in to let me see how well she was." For some time after operation she had pain in the gall-bladder region. At present she has no discomfort at all, feels perfectly well, does her own washing and ironing and looks the picture of health.

The specimen consists of a large mass of material which has evidently been an ovarian cyst. This has apparently ruptured before operation. It is made up chiefly of large cystic cavities filled with gelatinous-like material. In some of the cysts this material is dark reddish-brown in color, in others grayish-brown, and in some the cyst content is yellowish-white. The entire picture suggests a pseudomucinous ovarian cyst of large proportions. The umbilicus contains several small cysts as indicated by Figs. 11 and 12.

Gyn.-Path. No. 24072. The cyst was in some places lined with a low epithelium (Fig. 13 at *a*), but at most points this had melted away and we had a material that stained rather bluish with hematoxylin. The picture was that of a typical pseudomucinous cyst. At the umbilicus the small cysts were similar in character (Fig. 12), and one sees in the connective tissue little bluish areas where all trace of the epithelium has already disappeared. The general picture is that of a typical pseudomucinous cyst.

Carcinoma of the Umbilicus

In my *Diseases of the Umbilicus*, p. 400, carcinoma of the umbilicus was fully considered and abstracts of the more important cases were given. As a result of the analysis I made the following classification:

A. Primary umbilical carcinoma: (1) Squamous-cell carcinoma; (2) adenocarcinoma.

B. Secondary umbilical carcinoma: (1) From the stomach; (2) from the gall-bladder; (3) from the intestine; (4) from the ovaries; (5) from the uterus; (6) from other abdominal organs.

1. *Primary Squamous-cell Carcinoma of the Umbilicus.* Primary squamous-cell carcinoma of the umbilicus is very

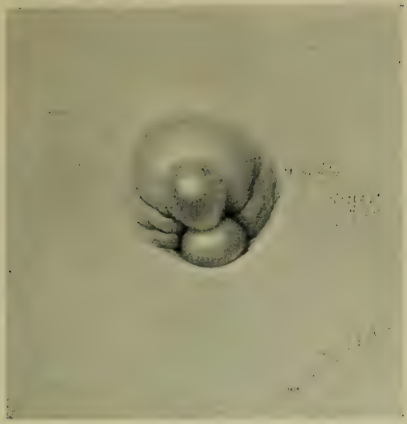


FIG. 11.—Small pseudomucinous cysts of the umbilicus secondary to a large pseudomucinous cyst of the ovary. C. H. I., No. 19252. Gyn.-Path. No. 24072. Occupying the upper part of the umbilicus are several small cysts. The umbilicus and the large ovarian cyst and the free pseudomucinous fluid in the abdominal cavity were removed.

FIG. 12.—Small pseudomucinous cysts at the umbilicus, secondary to a large pseudomucinous cyst of the ovary. C. H. I., No. 19252. Gyn.-Path. No. 24072. The squamous epithelium at the umbilicus is unaltered. Below this is an irregular, spherical area made up of small cysts. Lining a few of these was an ill-defined epithelium, and in the surrounding fibrous tissue were bluish areas where small glands had formerly existed. Most of the epithelium has melted away into pseudomucinous fluid. Coagulated pseudomucinous fluid is well seen at *a*. For the gross appearance of the umbilicus at operation see Fig. 11.

FIG. 13.—Portions of pseudomucinous cyst of the ovary. C. H. I., No. 19252. Gyn.-Path. No. 24072. In the lower part of the specimen is the fibrous tissue of the cyst wall, containing numerous small round cells. At *a* is a remnant of cuboidal epithelium. At *b* are projections of fibrous tissue which other sections indicate were at one time covered by epithelium. At nearly all points the epithelium has melted away into the sticky material which stains blue with hematoxylin. This is the usual picture in these pseudomucinous cysts.

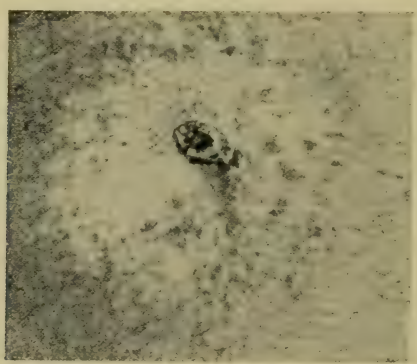


FIG. 14.—Epithelioma of the umbilicus emanating from an extensive atrophic scar following a severe roentgen-ray burn. (After Heidingsfeld.)

rare. In my book (p. 402) are recorded 3 cases from the literature that might possibly belong to this group.

Heidingsfeld,[18] professor of dermatology in the University of Cincinnati, in a very interesting article, entitled "Etiologic Rôle of Scar Tissue in Skin Cancer," gives a good picture of an epithelioma of the umbilicus in the center of an extensive atrophic scar following a severe roentgen-ray burn.

2. *Carcinoma of the Umbilicus Secondary to Carcinoma of the Stomach.* From a study of the literature[19] it is evident that, where secondary carcinoma of the umbilicus develops, the primary growth has been most frequently noted in the stomach.

On November 13, 1917, Dr. Frank Warner, of Columbus, Ohio, wrote me saying that he had just seen a case of carcinoma of the pylorus with a secondary growth at the navel.

The patient was a man, aged fifty-four years. Nineteen years before he had had symptoms indicating gastric ulcer. For six months before admission he had had gastric symptoms. At the time of his admission to the hospital there was a hard, red, firm mass at the umbilicus. This was tender on pressure. It had not ulcerated. At the pyloric end of the stomach was a large hard mass, not very freely movable.

The entire umbilicus was removed, but the stomach growth was too extensive to permit of a radical operation.

The umbilical growth was an adenocarcinoma undoubtedly secondary to the carcinoma of the pylorus.

The case is reported in detail elsewhere.[20]

3. *Carcinoma of the Umbilicus Secondary to Carcinoma of the Intestine.* Carcinoma of the umbilicus secondary to malignant growths in the intestine is rare (see *Diseases of the Umbilicus*, p. 425).

[18] Jour. Am. Med. Assn., November 18, 1916, p. 1502, Fig. 6. I have taken the liberty of reproducing Heidingsfeld's picture that appeared in the Journal of the American Medical Association.

[19] Diseases of the Umbilicus, p. 412.

[20] Warner, Frank: Carcinoma of the Umbilicus, Surg., Gynec. and Obst., 1918, xxvii, 204.

On September 25, 1916, I received the following letter from Dr. M. G. Wohl, pathologist of the Nicholas Senn Hospital:

I am sending you under separate cover two slides from an umbilical malignant growth. Will you be kind enough to express your opinion upon them?

The history of the case is as follows:

Mrs. C., aged sixty years. She had always enjoyed good health. For the past six months she had noticed a lump in the umbilical region. This annoyed her, but caused no pain.

Upon examination nothing abnormal was found except a protruding mass at the umbilicus, which was adherent to the underlying tissues.

Operation disclosed a mass the size of a child's head surrounding the umbilicus; this had pushed the peritoneum into the abdomen and had entirely displaced the recti muscles. It was firmly adherent to the transverse colon. The tumor was removed, together with eight inches of transverse colon.

The patient died of peritonitis. No postmortem was obtained, but at operation the stomach was found to be normal. There was, however, a nodule the size of a duck's egg in the sigmoid. It had the appearance of an adenocarcinoma.

My report was as follows: The sections show adenocarcinoma; in some places of a well-defined gland type; in other places the growth is more cellular, there is less stroma and there is a definite tendency for the epithelium to form solid nests.

Whether the primary growth was in the sigmoid or transverse colon cannot be determined with certainty. There was no opportunity to examine the rectal growth. Since then Wohl[21] has reported the case.

4. *Carcinoma of the Umbilicus Secondary to Carcinoma of the Rectum.* Carcinoma of the umbilicus following carcinoma of the rectum is rare. Frank Warner[22], in 1918,

[21] Carcinoma of the Umbilicus, Boston Med. and Surg. Jour., 1917, clxxvii, 442.

[22] Carcinoma of the Umbilicus, Surg., Gynec. and Obst., 1918, xxvii, 204.

reported the case of a man, aged sixty-eight years, who for a year or more had had occasional attacks of pain and soreness in the rectum, associated with attacks of diarrhea followed by constipation:

At the umbilicus was a mass 1 inch in diameter. This was hard and fixed to the deeper structures.

At autopsy two months later the rectum was found almost occluded by a scirrhous mass.

Microscopic examination showed that the primary growth was in the rectum and that the umbilical tumor was secondary.

The report is well worth a careful reading.

5. *Probably Secondary Carcinoma of the Umbilicus—Primary Source Undetermined.* In the accompanying cases the umbilical growth was an undoubted carcinoma, but no opportunity was afforded to determine whether the growth was primary or secondary. As primary adenocarcinoma of the umbilicus is very rare, they are included among the secondary growths.

Adenocarcinoma of the Umbilicus Probably Secondary. On July 2, 1919, I received a letter from Dr. Donald Guthrie, of the Robert Packer Hospital, Sayre, Pa. He had just operated upon F. H., a man, aged sixty-nine years.

The patient had had soreness in the umbilical region since Christmas, 1918. The hard lump about the umbilicus had grown slowly and there had never been any bleeding, discharge or pain. For the gross appearance of the umbilicus see Fig. 15.

Dr. Guthrie said: "From exploration at the time the abdomen was opened I am satisfied there were no metastases from the liver."

Gyn.-Path. No. 25172. The surface of the section is in places covered over by normal skin, at other points this has disappeared and there is a necrotic growth covering the surface. The superficial portion of this shows marked polymorphonuclear infiltration and the shadows of glands. In the depth is a typical adenocarcinoma, the gland type being particularly well pre-

served. At some points the gland epithelium tends to melt away and one gets the idea of a colloid growth. In the deeper portions the glands are much larger and the tendency toward colloid is even more marked.

It is impossible to tell where this carcinoma started; it apparently is secondary. The growth is undoubtedly malignant and the outlook is not good.

Adenocarcinoma of the Umbilicus Probably Secondary. Dr. Caroline McGill, on November 29, 1920, sent me an umbilicus from the Murray Hospital, Butte, Mont.

The patient, Mrs. G., aged forty-five years, four years before had fallen, striking the abdomen. For three months she had felt a small mass at the navel. Two weeks before admission it broke down, forming an ulcer. It was unassociated with pain.

When the patient was first seen on November 2, 1920, she had a wide-open umbilicus. Her past history was negative except for the fact that for three or four months she had had polyuria and polydipsia.

The patient was rather obese, had bad teeth, and varicose veins of both legs. The urine contained 2 per cent of sugar. She was put to bed and given a diabetic diet. In three days the sugar had disappeared.

Operation, by Dr. T. C. Witherspoon. The umbilical ulcer together with a wide area of fat and skin were removed under local anesthesia. Frozen sections made at the time (Dr. McGill tells me) showed adenocarcinoma. Two weeks after operation the patient was given radium and advised to come back for radium treatment later.

Gyn.-Path. No. 26364. The specimen consists of a small umbilicus together with a good deal of the surrounding adipose tissue. The umbilical depression is 5 mm. deep. It is rather difficult to determine just what the ulcer was like because the specimen has been in hardening fluid for some time. The tissue immediately beneath the umbilical depression shows what appears to be an irregular, fibrous transformation. The firm tissue beneath the umbilical depression is at least 1.5 cm. thick, and strands of this fibrous-looking tissue extend into the underlying fat. This is the picture that one usually finds with

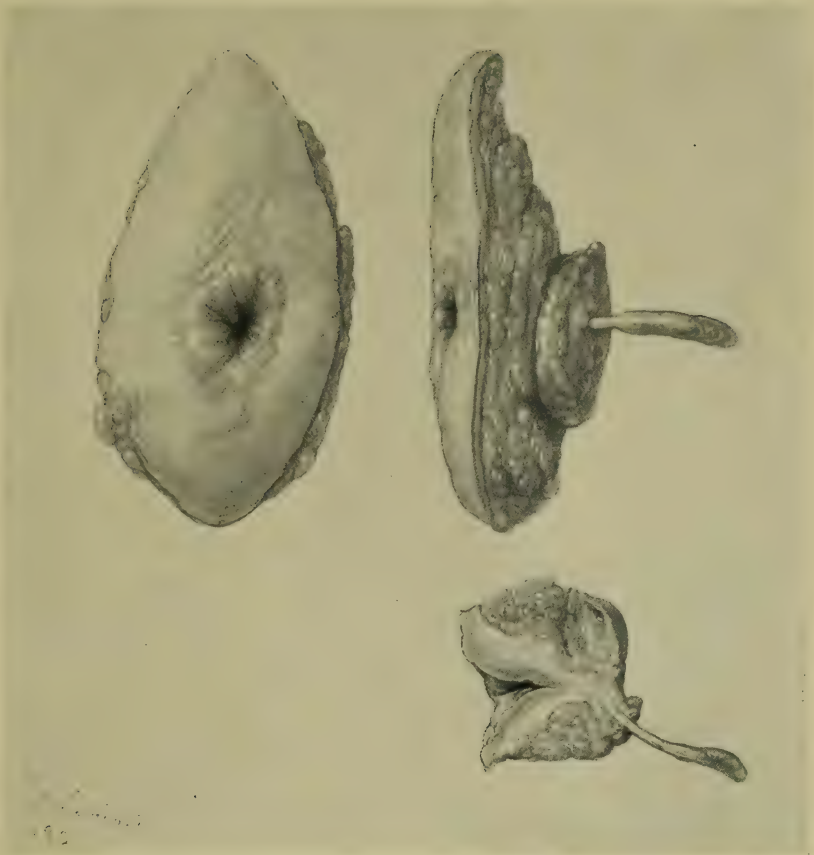


FIG. 15.—Adenocarcinoma of the umbilicus, probably secondary. Gyn.-Path. No. 25172. Specimen sent by Dr. Donald Guthrie, of Sayre, Pa. The umbilical margins are raised and in the central portion was some ulceration. The drawing to the right shows that the peritoneal surface was smooth, but that a small vessel passed from that point. The lower picture shows the apparent fibrous character of the umbilical depression. From this one would hardly think that a carcinoma existed. On microscopic examination it was found that the squamous epithelium in the umbilical depression had at some points disappeared and that the surface was covered with polymorphonuclear leukocytes. The growth was an adenocarcinoma, with areas suggesting colloid. Whether it was primary or secondary is not absolutely clear.

carcinoma of the umbilicus, and when the tissue is cut into one would not for a moment get the impression that he was dealing with a carcinoma.

The skin of the umbilicus at the margin of the ulcer shows little or no change. The surface of the ulcer is covered by polymorphonuclear leukocytes and in some places are glands extending right up to the surface. The firm, fibrous-looking area at the umbilicus is composed of fibrous tissue with quantities of glands scattered throughout it. Some are small, others rather large; nearly all are lined with one layer of cylindrical epithelium. Where the glands are dilated, some of them are filled with polymorphonuclear leukocytes and the gland epithelium is thinned out, becoming cuboidal or almost flat. In the depth some of the glands are minute. The picture is that of a typical adenocarcinoma. It is probably secondary, as primary adenocarcinoma is exceptional. It is, of course, as yet impossible to tell where the original tumor was.

A Malignant Abdominal Growth with a Secondary Nodule Just Above the Umbilicus. From the appearance at operation it was perfectly clear that the abdominal growth was malignant. Much as we desired to know the exact character of this growth, removal of a piece of the tissue would have added to the risk and consequently we refrained from excising any. The probabilities are that the tumor was carcinomatous. The umbilical growth was undoubtedly secondary to that occupying the abdomen.

C. H. I., No. 16098. Mrs. A. C., aged seventy-three years, was admitted to the Church Home and Infirmary late in May, 1917. Her abdomen was markedly distended. On account of dyspnea it was thought wiser to let her rest in bed for a few days before operation.

Operation, June 2, 1917. Situated just above and slightly to the right of the umbilicus was a hard plaque of tissue, about 3 cm. in diameter and raised about 2 mm. above the general surface of the abdomen (Fig. 16). The umbilicus itself was slightly indurated.

The growth in the umbilical region, coupled with the marked abdominal enlargement, at once suggested a malignant abdominal growth with a metastatic tumor at the umbilicus.

We made a very small midline incision below the umbilicus and let out quantities of ascitic fluid. The omentum had been converted into a solid mass at least 6 or 8 cm. thick, and nodules were found scattered throughout the abdomen.

We did not attempt to find the original source of the trouble, as we deemed it best to let the patient go home at the earliest possible moment.

Secondary Sarcoma of the Umbilicus

Sarcoma of the umbilicus whether primary or secondary is very rare (see *Diseases of the Umbilicus*, p. 449).

The following case is the only one in which I have had the opportunity of examining sections. The growth was a perithelial angiosarcoma (Fig. 17).

On June 14, 1921, Dr. F. C. Warnshuis, of Grand Rapids, Mich., saw Mrs. B., aged forty-five years, who for the past two years had noticed a peculiar enlargement and hardening of the navel. This was tender at times. The center of the umbilicus was soft, and her family physician told her that she had a small umbilical hernia. She wore a truss for a time, but discarded it on account of the pain it occasioned.

About the middle of March, 1921, her abdomen commenced to increase in size, and when Dr. Warnshuis saw her it was markedly enlarged. For the preceding two weeks she had had increasing distress from the distention, with dyspnea.

She had had five children. Her only previous illness had been typhoid fever when she was twenty years of age.

On examination the abdomen was found markedly enlarged and tense. It was symmetrical and suggested the picture of a large ovarian cyst. The umbilicus was indurated, but in its center was a small hernia.

Operation, June 14, 1921. On opening the abdomen Dr. Warnshuis found the bowel, mesentery and omentum adherent to papillary masses. There were secondary growths in the liver and enlarged mesenteric glands. The abdomen contained little fluid. As nothing could be done, the umbilicus was excised and the abdomen closed.

The patient died in thirty-six hours, apparently of shock coupled with pulmonary engorgement.

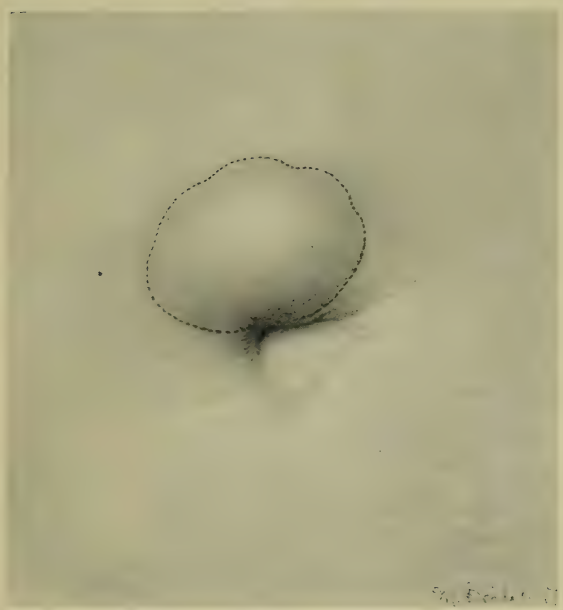


FIG. 16.—A malignant abdominal tumor with a secondary growth at the umbilicus. C. H. I., No. 16098. Mrs. A. C. May, 1917. The abdomen contained much ascitic fluid. The omentum had been converted into a solid mass over 6 cm. thick. Nodules were found scattered through the abdomen. No attempt was made to locate the original tumor. In the area indicated by the dotted line was an indurated and raised secondary growth which reached the upper umbilical margin.

Fig. 17.—Secondary sarcoma of the umbilicus. Specimen sent by Dr. F. C. Warnshuis. Gyn.-Path. No. 27169. This is a very low-power picture of the sarcoma. At the right the picture shows oval or round white spaces surrounded by dark zones. The white spaces are blood-vessels, and the dark zones consist of sarcoma cells. In other words, this part of the growth presents the typical appearance of perithelial angiosarcoma.

In answer to a further query, Dr. Warnshuis, under date of October 28, 1921, says: "I am sorry that it was not possible to secure a postmortem, because then we would have been able to determine from just what structures the sarcoma arose. From the physical examination and from the apparent density of the mass in the pelvis I would advance the conjecture that it arose from the ovary."

Gyn.-Path. No. 27169. The specimen, which consists of the umbilicus with a little of the surrounding skin, is 3 cm. long and 2 cm. broad. It consists in large measure of a tumor springing from the umbilical depression. The tumor measures 2.3 by 2 cm. and the overlying skin is stretched and smooth. The tumor on section appears uniform, is rather soft, is somewhat porous, and differs entirely in texture from those secondary growths usually found at the umbilicus. The latter are invariably hard and fibrous-looking.

With the low power one sees a very cellular growth embedded in a small amount of loose stroma. At many points it is perfectly evident that the growth is arranged around vessels, and we see longitudinal or cross-sections of them (Fig. 17). The bloodvessels are small, have very thin walls, and are surrounded by spindle cells. These are cut either longitudinally or transversely; sometimes the spindle cells appear to run parallel with the long axis of the vessel, sometimes transversely. The more solid portions of the growth present the usual picture of a spindle-cell sarcoma. There has been some hemorrhage into the growth in the past, as evidenced by the fact that quite a number of the cells have taken up yellowish-brown granular pigment. There is also considerable edema and liquefaction. The growth is a perithelial angiosarcoma.

This is the first sarcoma of the umbilicus that we have encountered. From what Dr. Warnshuis said, it was impossible to determine with certainty the source of the original tumor, but he came to the conclusion that it was in all probability from the ovary.

An Amniotic Umbilicus[23]

This condition is characterized by an absence of the skin around the umbilicus, the defect being replaced by amnion which is reflected upon the abdomen from the cord. In such cases the surrounding abdominal wall is usually intact.

On July 2, 1919, Dr. Margaret Tyler, of the department of obstetrics and gynecology of the New Haven Hospital, wrote me concerning a case that had come under her care. The letter is as follows:

> I am sending you the picture of a baby born on our ward two months ago. This shows several interesting conditions, among which are chondrodystrophy, internal hydrocephalus, congenital cystic edema, and a condition at the umbilicus about which I want to ask your opinion. The skin has not come together in the usual manner and does not extend up the cord; the intestines are plainly visible through the cord, with apparently nothing but peritoneum and amnion over them. It conforms very well, it seems to me, to the condition described in your book on the umbilicus as an amniotic umbilicus. There is no real hernia, as the intestines do not protrude through the defect in the abdominal wall. Will you be kind enough to tell me if this is a true amniotic umbilicus?

Dr. Tyler's surmise was correct.

Umbilical Herniæ at Birth

It is probable that umbilical herniæ at birth are due to one of three causes or to a combination of these: (1) Stretching of an amniotic umbilicus; (2) the escape of abdominal contents through a patent umbilicus; (3) the failure of the intestines to recede into the abdomen.

As we all know, in the early months of fetal life the intestines extend into the cord. Dr. George L. Streeter was good enough to send me the picture from which Fig. 18 has been

[1] Diseases of the Umbilicus, p. 461.

Fig. 18.—Hernia into the umbilical cord. This photograph was kindly sent me by Dr. George L. Streeter, director of the Carnegie Research Laboratory in Embryology at the Johns Hopkins Medical School. No. 1585. Length of head and trunk 19 cm. The cord at the umbilicus is greatly enlarged and cystic, and shining through its thin walls are the dark outlines of intestinal loops. As one passes outward the cord assumes its normal size and appearance. This is a typical example of a hernia into the umbilical cord.

made. Here we can readily see intestinal loops shining through the wall of the umbilical cord.

Prompt operative interference is the only treatment to be thought of. Delay of a few hours may be fatal.

On January 8, 1920, I received a letter from Dr. William I. Stanton, of Washington, telling me of a most instructive case that had come under his care. His report is as follows:

I am taking the liberty of writing you in regard to a case of hernia into the umbilical cord. It is the first one I have seen.

I delivered a girl baby at term in a private home on December 22, at 2.15 in the morning. There was a large mass in the abdominal end of the cord, about the size of my fist. On holding up the cord and placing the lamp distal to the mass I could see the intestines through the amniotic covering of the cord. The bloodvessels in the cord entered the abdomen to the right of and below the hernia. There was a small cyst of the cord at the junction of the hernial mass. The cord was ligated distal to the mass.

Immediate operation was advised, but the parents would not consent. The cord and hernial mass were dressed with sterile gauze and the child put to bed.

I visited the patient next morning and, on examining the hernia, noted that the intestines had changed in color to a dusky red. The parents were informed that unless the child was operated on she would perish, and that if not allowed to operate I would discontinue the case.

I finally obtained permission to operate and took the infant to the Georgetown University Hospital. Dr. Thomas F. Lowe was called to give ether and we operated at two in the afternoon, just twelve hours after the time of birth.

On opening the amnion and peritoneum we found the hernia to consist of the colon, cecum, appendix and small intestine, in all about two feet. The intestines were adherent to the wall of the sac over one-half its area. The umbilical ring admitted the tip of the index finger. The adhesions were freed. An incision was made through the umbilical ring and continued for about two inches. The bowels were returned to the abdominal cavity and the incision and umbilical ring closed with three silkworm-gut mattress sutures, the sac and skin edges having been cut away from the umbilical ring previous to this. The

bowels showed signs of beginning strangulation. The appendix was not removed, as I did not wish to prolong the operation unnecessarily. The infant was returned to its mother the same night and a regular four-hour-feeding begun. The patient made an uneventful recovery and the sutures were removed on the twelfth day.

The following case exemplifies the tragedy that is almost sure to occur where the hernia of the cord remains for several days. Even in a few hours the outer covering may become dry and crinkly, and the intestines show much cyanosis.

I did not see this child until the ninth day. At this time there was a peritonitis.

Sloughing and Necrotic Hernia of the Umbilical Cord. C. H. I., No. 18359. Baby P., aged nine days, was admitted to the Church Home and Infirmary, January 14, 1918. As soon as the baby was born a tumor was noted at the navel. The midwife, Anna Parr, said that the cord came off from the edge of the right side. The umbilical mass was 4 cm. across, circular, and projected about 3.5 cm. from the surface of the abdomen (Fig. 19). The skin was carried up on the surface of the tumor for at least 1 cm. and then ended as a pinkish ridge. When I saw the child it was impossible to detect any intestinal coils through the membrane covering the tumor. The surface of the tumor was covered with pus and it had a very fetid odor.

Operation. After carefully cleansing the tumor as far as possible, we opened the abdomen at the base of the mass, and continued the incision around the base of the mass until it was completely freed from the abdominal wall. The sac was then slit up and the intestinal contents were exposed (Fig. 20). The amniotic membrane was gradually peeled away from the surface of the intestine, but when we had done this the intestines were found to be covered with a greenish-yellow, fetid discharge. As there was blockage of the bowel, nothing remained for us to do but a resection. We removed about eight inches of the small bowel, the cecum and some of the ascending colon, closed both ends and did a lateral anastomosis. It was suggested that we might leave one end of the bowel open, and we thought of doing this, but when one remembers the way children cry and the absolute lack of control that one has over them, I thought

Fig. 19.—Sloughing hernia of the umbilical cord. C. H. I., No. 18359. Baby P. This was the picture noted on the ninth day, when the child came to my office. At the umbilicus was a large, foul mass. After removal of the secretion the surface of the growth was found covered by a very thin, parchment-like membrane, which was in some places dry and crinkly and at other points represented by a purulent membrane. Coming off from the side of the mass was a mummified cord. The abdominal skin was carried up on the surface of the tumor for a considerable distance, forming a definite collar. For the appearance of the contents of the sac see Fig. 20.

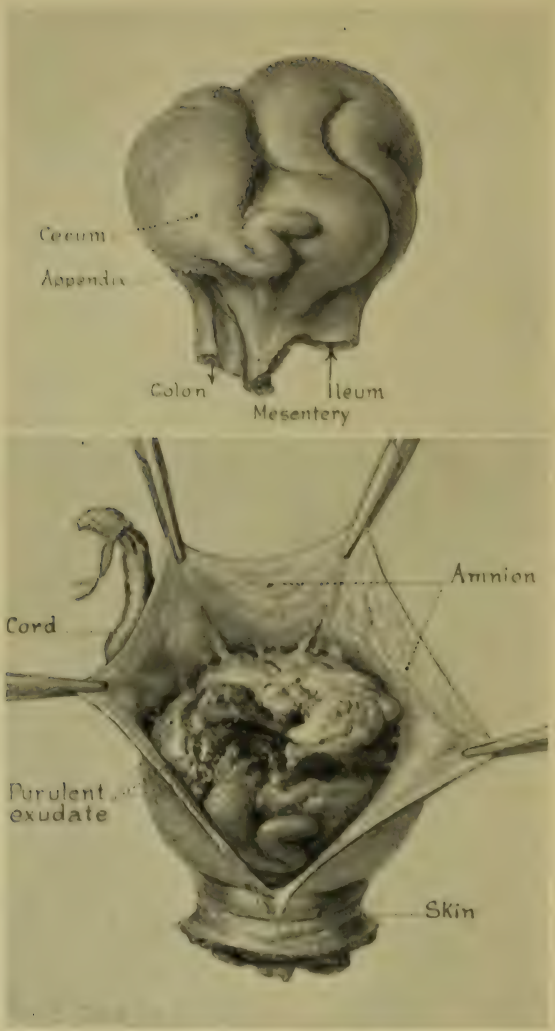


Fig. 20.—Hernia of the umbilical cord, accompanied by general peritonitis and partial intestinal obstruction. Removal of the cecum and eight inches of the small bowel that were incarcerated and obstructed in the sac; death on the eighteenth day after operation from a continuation of the general peritonitis. C. H. I., No. 18359. Baby P. The lower picture shows the hernial sac and its contents after removal. At operation the abdomen was opened at the base of the hernia and the incision continued all the way around the base. When the sac had been completely severed from the abdomen it was possible to lift it well away from the abdominal wall and to wall it off satisfactorily. The sac was now slit open and its contents found so matted together by purulent material and so constricted that there remained but two plans of procedure—resection of the bowel, leaving one or both ends open, or resection with lateral anastomosis. We chose the latter procedure on account of the extreme delicacy of the structures in a child only nine days old. The upper picture gives an idea of the contents of the sac—the cecum with the appendix and about eight inches of small bowel.

it was wiser to close the ends of the bowel. We left a small drain in the lower angle of the incision. The child stood the operation well but was very cyanotic before it woke up.

January 15, 1918. The child has taken some water with a little sugar and also has taken the breast. As a result of enemata, fecal matter has been discharged by bowel.

After several days there was a leakage and some fecal matter escaped from the umbilicus. At times nearly all the fecal matter came away in this manner; at other times there were well-formed stools. Finally all the fecal matter passed through the bowel and the fistulous tract closed up completely.

January 31. About three days ago the child started vomiting, and Dr. Charles L. Summers saw it with me. The infant was apparently doing well until this morning at 6.30, when he suddenly died.

Autopsy showed that the peritonitis which we had found at the time of operation had persisted, and that there were purulent accumulations between intestinal loops and down in both the right and left flanks, as well as in the pelvis. It is almost unbelievable that a child with such widespread peritonitis could have survived eighteen days after such an operation.

Had the child been brought to the hospital within the first twenty-four hours, and before any peritoneal infection had occurred, the operation would, of course, have been a very simple one and the prognosis would have been good.

One of the most brilliant results in such a case was in the one operated on by Dr. Edward N. Reed, of Clifton, Ariz. This case was recorded in the *Journal of the American Medical Association* and is reported in full in *Diseases of the Umbilicus*, p. 460.

A Satisfactory Method of Dealing with Intestinal Loops Densely Adherent to the Walls of an Umbilical Hernia

In 1918, I saw a patient, aged seventy-eight years, who had a partial intestinal obstruction due to a very large umbilical hernia. At operation I found many loops of bowel so adherent to the sac that their liberation was impossible.

The patient was not in good condition and we were in a serious dilemma.

Finally, I dissected the skin away from the sac, and then with the aid of transmitted light separated the loops from one another, leaving pieces of sac attached to the loops of intestine. When all of the bowel had been unraveled we had at least thirty to forty ragged pieces of sac attached to the bowel. These "patches" were trimmed off precisely as would be the repair patches on the inner tube of a bicycle tire. The surfaces of the patches were relatively smooth; they did not bleed. The intestines were returned to the abdomen and the hernial opening closed. The patient, a physician, is still in active practice, although eighty-two years of age.

This method will undoubtedly be of value in a certain group of umbilical herniæ.

The case has been reported in detail in the *Journal of the American Medical Association.*

Persistence of the Urachus[24]

Very little relating to the urachus has come to my attention during the last six years.

I have seen one case with persistence of the vesical end of the urachus, and recently Dr. John E. Cannaday, of Charleston, W. Va., gave me the report of a case in which there was marked dilatation of the urachus associated with an imperforate urethra and absence of the rectum.

On January 25, 1922, when opening an abdomen in a case of pelvic inflammation, I encountered a urachal cyst measuring about 8 by 7 mm. This contained clear fluid and had very thin walls. It was directly continuous above and below with the urachal cord, which did not average over 1 mm. in diameter.

[24] Diseases of the Umbilicus, p. 481.

Fig. 21.—Persistence of the lower end of the urachus. C. H. I., No. 17084. Mrs. M. K. June 11, 1917. The umbilicus is unusually prominent. In the midline below is the urachus, which has been ligated. At the point of ligation it was 4 mm. in diameter; as it passed away from the bladder it became gradually smaller and half-way to the umbilicus disappeared. At the bladder the urachal stump was treated just as when dealing with an appendix.

Persistence of the Vesical End of the Urachus. C. H. I., No. 17084. Mrs. M. K., aged thirty-one years, entered the Church Home and Infirmary, June 11, 1917. She was referred to me by Dr. H. P. Fahrney, of Frederick, and gave a history of having had a slight umbilical discharge at times. She also gave a definite history of chronic appendicitis and complained of a vaginal discharge.

Operation. We opened the abdomen in the midline, making an elliptical incision which included the umbilicus. This incision was continued downward, much care, however, being exercised to avoid the urachus. The urachus was examined and found to vary from 1 to 4 mm. in diameter (Fig. 21). The dilatation was a gradual one, increasing as one approached the bladder. We clamped the urachus near the bladder, tied it with catgut, and then took a purse-string of linen thread, turning in the stump just as one would do in dealing with an appendix. The area was then reinforced with catgut. The appendix was everywhere covered with adhesions. It was removed.

The patient made an uneventful recovery.

Absence of the Rectum, Imperforate Anus, Imperforate Urethra, Marked Dilatation of the Urachus. At the meeting of the Southern Surgical Association at Pinehurst, N. C., December 14, 1921, Dr. John E. Cannaday, of Charleston, W. Va., gave me a written report of the following case:

On July 20, 1921, an infant, thirty-six hours old, was referred to me by Dr. Atlee Mairs, of Charleston, W. Va.

Examination shows a poorly developed infant; male; abdomen large and protuberant, distended in bladder region, flat to percussion over bladder area; anus absent, no dimpling; abdominal distention more noticeable on left side. The child has not voided urine; am unable to introduce catheter into bladder; firm obstruction met with in perineal region.

Diagnosis. Imperforate anus; imperforate urethra.

Operation. Novocain anesthesia. Right rectus incision in left lower abdomen. Exploration shows entire absence of rectum, a fibrinous cord being in the location of the sigmoid. Ascending colon greatly distended. Urinary bladder greatly distended. Urachus distended all the way from the umbilicus to the bladder; diameter of urachus about 3 cm.

The lower portion of the sigmoid was brought up into the

wound, incised, and a rubber catheter fixed in the lumen by catgut sutures. The sigmoid was attached to the parietal peritoneum at that point.

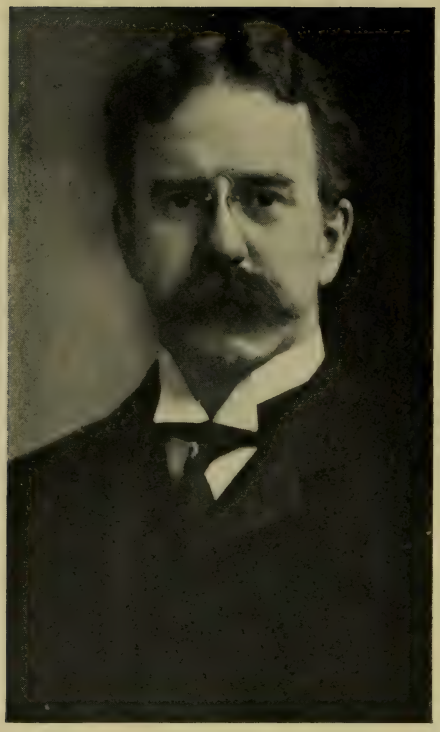
It was thought best to attempt to relieve the urinary obstruction by way of the umbilicus. A small probe was gently insinuated into the folds of that structure and a flow of urine immediately appeared at that point. A small rubber catheter was inserted at the umbilicus and about $4\frac{1}{2}$ ounces of normal urine were recovered. The orifice was gently dilated and the tense fulness of the urachus and bladder had by this time disappeared.

The patient was removed from the hospital the next day by its parents. The living conditions at their home were unfavorable and the baby succumbed at the end of ten days from inanition. No autopsy was obtained.

Comment

In the foregoing pages I have given a short account of the umbilical and urachal conditions that have come under my observation during the last six years. Our knowledge concerning lesions of this region is steadily increasing. If pathologists, physicians and surgeons will systematically record abnormalities of the umbilicus coming under their care, only a few more years need elapse before our knowledge of diseases of the navel will be fairly complete.

I cannot let the opportunity pass without thanking those who have written me and also sent me specimens, slides and pictures of their cases. I am under many obligations to Dr. John Howland. Any interesting umbilical case coming to his clinic at the Harriet Lane Hospital has been brought to my attention, not only for observation but also for treatment. Dr. Max Zinninger has been good enough to locate quite a number of the cases for me. My heartiest thanks are due to my friend Max Broedel, director of the department of art in medicine, for his excellent drawings, and I am indebted to Mr. Hermann Schapiro for the photomicrographs, which are unusually good considering the thick sections I furnished him. Dr. Benjamin O. McCleary and Mr. Joseph Hoffman have helped me continually in the preparation of the article.



LEWIS CRENSHAW BOSHER, M.D.

IN MEMORIAM.

LEWIS CRENSHAW BOSHER, M.D.

1859–1920

Dr. Bosher died at his home in Richmond, Va., September 12, 1920, in the sixty-first year of his age.

He was a native of Richmond, where he received his academic and medical education and where he returned to practice after several years of hospital work in New York.

He was elected a member of this Association in 1890, vice-president in 1901 and president in 1905. He enjoyed the confidence and respect of the entire fellowship.

His career in medicine in Richmond was a notable one. When he returned to Richmond to practise he became at once identified with his alma mater, the Medical College of Virginia, and this association continued until the time of his death, although for the last few years his work had not been active. He was one of the strong men of the college and to him it owed much of its reputation and popularity. He was first associated in the department of anatomy, of which he subsequently became professor. Following this he became professor of the principles of surgery and genito-urinary surgery, the professor of surgery and later professor of genito-urinary surgery. As a teacher he was clear and forceful and enjoyed to an unusual degree the confidence and esteem of his students. His work as a surgeon was marked by con-

servatism and sound judgment. His cases were always well worked out and well presented, making him a particularly good clinician.

His most useful and important work was in the establishment and administration of hospitals. He was very active in the hospitals associated with the Medical College of Virginia, first the Old Dominion Hospital and later the Memorial Hospital. To these he gave largely of his time and money. For some years he was president of the Memorial Hospital Corporation and chairman of the executive committee. His ambition was to make of these institutions efficient units for the development and teaching of medicine. He was content if they fulfilled this function and seemed to care little for his personal advancement. He was never jealous of his colleagues and enjoyed their entire confidence and affection. His last work for hospitals was in the Stuart Circle Hospital of Richmond, which was built by himself and associates, and formed into a corporation of which he was the first president, serving until his death. The underlying principle of the hospital was an association of doctors following various specialties who should by their association render the most efficient service.

He was a member of the American Surgical Association; of the American Association of Obstetricians and Gynecologists; of the Association of American Anatomists; of the American Urological Association; and ex-president of the Richmond Academy of Medicine and Surgery.

As a man he was loved and admired by all who knew him. His modesty, his uprightness, his high character and ideals gave him an unique position in the profession. He had no enemies and none spoke evil of him. He will always be remembered with affection.

CHARLES R. ROBINS.

HORACE H. GRANT, M.D.

HORACE H. GRANT, M.D.

1853–1921

Dr. Horace Henry Grant, aged sixty-seven years, a Fellow of this Association, died at the Norton Memorial Infirmary, Louisville, Ky., after a brief illness, January 24, 1921. He was born in Boone County, Kentucky, in 1853; a graduate of Centre College, Kentucky (A.B.), and of Jefferson Medical College, Philadelphia (M.D.).

He was professor of surgery in the University of Louisville, Medical Department, at the time of his death, and had been for years a leader of medical thought. Much of his time and labor was devoted to medical teaching, first in anatomy and surgery in the Kentucky School of Medicine, and later in surgery in the Hospital College of Medicine and the University of Louisville. He was possessed of unusual energy and great executive ability, and was recognized as a surgeon of skill and ability. He wa a man of the highest integrity of character, and a true and loyal friend.

Dr. Grant was a fellow of the American College of Surgeons, being one of its founders; was a fellow of the American Medical Association; a fellow, and once president, of the Mississippi Valley Medical Association; a member of the Kentucky State and the Jefferson County Medical societies.

He was the author of *Principles of Surgery and Diseases of the Mouth and Jaw*, published in 1902, and until recently was one of the editors and business manager of the *Louisville Monthly Journal of Medicine and Surgery*. He invented a number of surgical instruments which are in wide use. One

of the most notable of these is a clamp for the open treatment of fractures.

Dr. Grant was able to make many friends and to hold them, and among these were numbered the fellows of this of this Association.

J. Garland Sherrill.

JOSEPH RANSOHOFF, M.D.

JOSEPH RANSOHOFF, M.D.

1853–1921

Joseph Ransohoff was born in Cincinnati, May 26, 1853, He was the son of Nathan and Esther Ransohoff, who came to this country from Westphalia, Germany, in the first quarter of the last century. His early education was received in the primary, intermediate and high schools of his native city. From the high school, at which he was graduated in 1870, he entered the Medical College of Ohio, where he took his degree with honors, after a year spent as intern in the Cincinnati Hospital in 1874.

Encouraged by his brilliant record as student, and ambitious for his future, his parents, though not heavily endowed with this world's goods, determined to give him the benefit of study abroad. He spent three years in the clinics of Germany and Austria, and before returning took the examinations, first for membership and subsequently for fellowship, in the Royal College of Surgeons of England. These examinations he passed with credit and was the first American in the western country to acquire the title of F.R.C.S. (Eng.) by examination, a distinction in which he took a pardonable pride.

Upon his return to Cincinnati, in the fall of 1877, he became recognized at once as one who would go far. He was appointed demonstrator of anatomy in his alma mater, and two years later was appointed professor of descriptive anatomy. He was at this time visiting surgeon to the Jewish Hospital.

In 1879 he was married to Miss Minnie Workum Freiberg, who, in later years when the cares of a family no longer engaged her attention so fully, loved to accompany him to the meetings of this Association, always taking an active interest in its proceedings and acting the part of generous hostess whenever the Association convened in her home town. Their marriage was blessed with five children, all of whom survive, and one of whom, Dr. Louis Ransohoff, is following in his illustrious father's footsteps.

Dr. Ransohoff's appointment to the staff of the Good Samaritan Hospital brought him early into contact with the students of the Medical College of Ohio as a clinical teacher, and it was this phase of his activities which constituted one of his greatest claims to distinction.

Dr. Ransohoff was endowed with a splendid memory. His acquaintance with surgical literature was exceptional, gained by a ready access to foreign journals from his thorough knowledge of French and German. He could have given an interesting series of talks on the history of medicine without consulting a book of reference. It was this vast fund of stored-up knowledge which made his clinical and didactic lectures at once interesting and instructive. Added to this knowledge was an unusual facility in expressing his thoughts. His voice was pleasantly modulated, which contributed not a little to the pleasure of hearing him talk. In other fields of literature than those of medicine he was singularly well informed, and his writings on topics unallied to medicine were characterized by a grace of expression which would have readily won recognition in the field of general literature.

His contributions to surgical literature were many and covered a great variety of subjects. The writer has looked over one hundred and forty-four reprints, embracing almost the entire range of subjects which engage the surgeon's interest today. In the realms of gall-bladder and thyroid surgery Dr. Ransohoff was one of the pioneers in this country. He was a careful and successful operator; his work was not

marked by dash or rapidity. Although of the older generation whose training was in preaseptic days no one more rigidly adhered to all the rules of advanced aseptic technic.

Dr. Ransohoff had an essentially scientific type of mind and was always profoundly interested in the scientific aspects of his cases, never failing to be present when autopsies were procurable. His skill in diagnosis was universally recognized, although his zeal in discovering rare and interesting cases would occasionally lead him momentarily astray.

As visiting surgeon and, with the reorganization of the staff, director of the First Surgical Service of the Cincinnati General Hospital, more of his time was devoted to the correlating of cases for the purpose of bedside teaching, and here it was that his genius for teaching shone most conspicuously. His clinics were always attended by a large number of students, eager to learn from his wide experience.

Dr. Ransohoff was an active member of and frequent contributor to the *Transactions* of many societies. Beside this Association, which he joined in 1900 and to which during the twenty years of his membership he contributed twelve papers, he was a member of the American Surgical, the Western Surgical and the American Medical Associations, the Ohio State Society and the Cincinnati Academy of Medicine, of which last he was one-time president. Of all these societies he has been frequently heard to say his love for and interest in the Southern Surgical Association was the greatest. It was one of the great disappointments of his life that ill health obliged him to forego the last meeting at Hot Springs, Va. Some premonition that it would be the last meeting for him must have possessed his mind. He was greatly touched and made very happy by the evidence of the regard in which he was held by his fellows, as evidenced by the telegram of sympathy and regret for his enforced absence at that meeting.

In August, 1920, Dr. Ransohoff was stricken, while at his summer home in Massachusetts, with what was regarded

as a severe attack of cholecystitis. His health prior to that had been failing. Attacks of angina pectoris supervened on the acute attack suffered in August. When he returned in the fall he attempted to resume his work in the college and hospital, but was soon obliged most reluctantly to relinquish it, to the great regret of the students and of his colleagues. He lingered on through the winter with more frequently recurring attacks of angina. March 10, 1921, he passed quietly away. His funeral obsequies were attended by a great concourse of people from all walks of life. His body was borne to its last resting place by members of the senior class of college. So he would have had it. It was fitting that this final testimony of love and respect should be paid by those he so loved to teach.

His absence at future meetings of this society, so beloved by him, will be felt, and the widow left desolate by the loss of her companion of forty years will have sad recollections at each succeeding meeting of the Society which she also so loved to attend. To her and to the other members of his family are extended our heartfelt sympathy.

C. E. Caldwell.

EDWARD GROVES JONES, M.D.

EDWARD GROVES JONES, M.D.

1874–1921

Dr. Edward Groves Jones was born near Summerville, Ga., January 14, 1874. He graduated A.B., with first honor, from Emory College in 1895. For the next two years he taught school at Albany, Ga. He then entered the Atlanta College of Physicians and Surgeons, from which institution he received his medical degree with first honor in 1900.

The following summer Dr. Jones studied internal medicine under Osler, and pathology under Barker, at the Johns Hopkins Hospital. The next year he studied gynecology under Montgomery, in Philadelphia.

He taught several branches of medicine in the Atlanta College of Physicians and Surgeons, and in 1905 was one of the prime movers in the organization of the new school in Atlanta, The Atlanta School of Medicine.

Dr. Jones taught gynecology and general surgery in this institution until 1913, when the school became merged with the parent college and became once more the Atlanta Medical College. In 1915 this school became the medical department of Emory University, and Dr. Jones was made professor of surgery. He held this position until the time of his death, October 6, 1921.

From these data it will be seen that a great deal of Dr. Jones's energies were devoted to the cause of medical education. He was a fine organizer in such work and a teacher of unusual ability. Dr. Jones's special work was done on the

thyroid gland, and he contributed many meritorious articles on this subject to the literature.

As a speaker he ranked as one of the best in the medical profession of the South. He was president of the Medical Association of Georgia in 1920, and vice-president of the Southern Surgical Association the same year.

His death removes from this section one of the most competent surgeons and a man whose achievements gave promise of an even more successful future.

W. M. PERKINS, M.D.

1873–1921

Dr. W. M. Perkins was born April 1, 1873, and died September 1, 1921. He attended the Tulane High School, graduating there June 19, 1888, and then attended the academic department of Tulane University, from which he received the degree of B.S., June, 1897, just after he received his degree of doctor of medicine. While attending the medical lectures he was an intern in the Charity Hospital for two years, receiving his hospital diploma April 5, 1897.

Dr. Perkins was a member of the Louisiana State Medical Society, of the American Medical Association and of the Southern Surgical Association for a number of years. He was secretary of the Louisiana State Medical Society for a number of years and was one of the most efficient secretaries the society ever had. He also made a splendid record as secretary of the Louisiana State Board of Health.

He entered the Medical Reserve Corps of the United States Army in 1918, going over to France as Captain and returning in the summer of 1919 with the rank of Major.

He entered one of the summer camps in charge of hospital work in 1919 and remained for several months and then came home. He was taken ill with what was apparently a cerebral hemorrhage, from which, however, he partly recovered but never entirely regained his health, dying suddenly while asleep in bed September 1, 1921. Dr. Perkins was visiting surgeon to Charity Hospital, New Orleans, for a number of years.

F. W. P.

FLOYD WILLCOX McRAE, M.D.

FLOYD WILLCOX McRAE, M.D.

1861–1921

Floyd Willcox McRae was born December 6, 1861, in Telfair County, Ga. His father was Murdock M. McRae and his mother Elizabeth Willcox. He was a grandson of Alexander McRae, who came directly from Scotland.

His education was obtained in the district schools of his vicinity and at the Robert E. Lee Institute, Thomaston, Ga. He graduated with honor from the Atlanta Medical College, Atlanta, Ga., in 1885. Following this, he took post-graduate courses in the New York Polyclinic and the New York Post-graduate Medical School and Hospital, 1887 to 1890. These were later supplemented by post-graduate study in other medical centers of this country and abroad. He practised medicine and surgery in Atlanta, Ga., since 1885. The last fifteen years or more of his life were devoted to abdominal surgery and gynecology exclusively.

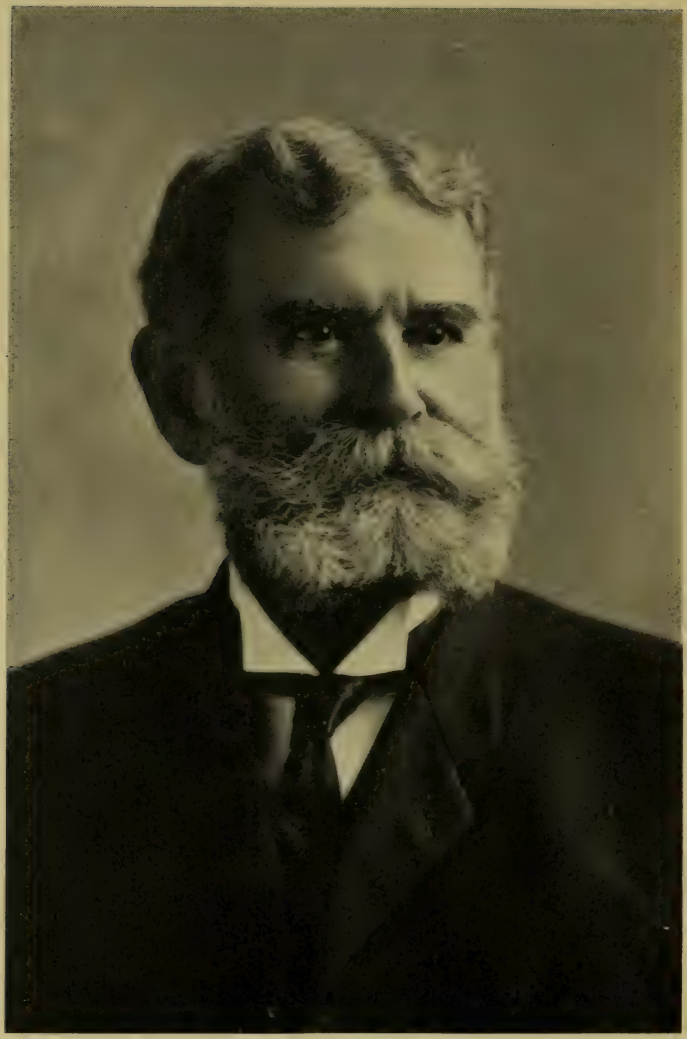
He was a member of the American Medical Association and was vice-president of that organization. He delivered the oration on surgery in 1900. Afterward he was elected secretary of the section of surgery and anatomy. His other honors were: Member of the Pan-American Medical Congress, London 1914; ex-president of the Southern Surgical Association; ex-president of the Medical Association of Georgia; ex-president of the Atlanta Society of Medicine; member of the American Surgical Association; member of the board of health of Atlanta, Ga.; fellow, American College of Surgeons.

Following his graduation in Atlanta, he was demonstrator of anatomy at the Atlanta Medical College; professor of surgery later on in the same institution. He was consulting surgeon to Grady Hospital and also professor of physiology in the Southern Dental College. He organized and for a number of years later ran the *Medical Journal of Georgia*. He was visiting surgeon to all of the hospitals in Atlanta.

Among his medical literary work were the following: "A Method of Continuous Drainage of the Urinary Bladder following External Urethrotomy or Prostatectomy"; a number of articles on organic stricture of the male urethra by combining internal and external urethrotomy with perineal drainage; several papers on appendicitis with report of cases and personal experience; "Stones in Bladder," with report of cases; "Diaphragmatic Hernia," with report of cases; "Gunshot Wounds of the Abdomen," in Kelly and Noble, vol. ii, and other papers and addresses.

In March, 1920, he had a severe illness, developed pneumonia, and in September, 1920, went to Johns Hopkins Hospital for rest, at which time he was under Dr. Barker's care and gained twenty pounds. However, due to the marked overwork and strain which he subjected himself to during the war, associated with the worry, he did not recuperate as rapidly as he had hoped, so that he did very little work until May, 1921. At this time he resumed his office and hospital work and was gradually regaining his normally cheerful attitude and working along smoothly, when on August 13, 1921, he was killed by the accidental discharge of a pistol at his residence in Atlanta, Ga.

He is survived by his wife, and three sons, Dr. Floyd W. McRae, Jr., of Atlanta, Ga.; Kenneth C. McRae, of Detroit, Mich., and Dr. John Collier McRae.



JOSEPH TABER JOHNSON, M.D.

JOSEPH TABER JOHNSON, A.M., PH.D., M.D., LL.D.

1845–1921

DR. JOSEPH TABER JOHNSON, former President of the Southern Surgical and Gynecological Association, died at his home in Cherrydale, Virginia, March 12, 1921, in the seventy-sixth year of his age.

His parents were Lorenzo Dow and Mary (Burgess) Johnson, and he was born in Lowell, Mass., June 30, 1845. He was a descendant of John Alden and Priscilla Mullens, of the *Mayflower*, and grandson of Jeremiah Johnson, a soldier of the Revolutionary War.

His early education was secured at Rochester Academy, Plymouth County, Mass., 1855–9, and Columbia College (now George Washington University), Washington, D. C., 1860–2.

His degree in medicine was obtained in 1865 from the Medical Department of Georgetown University, and in 1868 from Bellevue. His Master of Arts degree was conferred by Columbia College in 1869. After studying obstetrics in Paris and Vienna, he received in the latter city, in 1871, a diploma in that branch of medicine, The Ph.D. degree was conferred on him by Georgetown University in 1890, and at its 125th anniversary in 1914 he was presented with the honorary degree of LL.D.

His practical professional work in medicine began as an acting assistant surgeon in the United States Army. He was connected with the Freedmen's Hospital—an institution that came into existence at the termination of America's great Civil War—from 1868 to 1873—and coincidently was

professor of obstetrics and gynecology in Howard University. This school was also the expression of the United States government for the education and uplift of the recently emancipated negro, the hospital being created for the treatment of his sick, and the two institutions being adjacently located and managed in complement.

He was lecturer on obstetrics in Georgetown University, 1874–6; its professor of obstetrics and gynecology, 1876–1887; its professor of gynecology and abdominal surgery, 1887–1912, thus serving as a teacher in that popular school of medicine thirty-eight successive years. In addition he was president of its faculty, 1883–1897; its vice-president from 1897 to 1912, and president of the medical board and chief gynecologist of the Georgetown University Hospital for several years.

For many years he was the gynecologist to Providence Hospital and at two periods served as gynecological surgeon to Columbia Hospital for Women, the second oldest hospital of the kind in America. He was consulting gynecologist to Emergency Hospital, and from 1887 to 1912 conducted his private hospital for women. It is stated he performed more than three thousand abdominal operations and the first ovariotomy in the District of Columbia. He retired from the active pursuit of the practice of his profession in July, 1915, fifty years after his graduation in medicine.

His membership in medical organizations was large: A member of the Medical Society of the District of Columbia; a founder of the Washington Obstetrical and Gynecological Society and its president in 1887–9; a Fellow of the American Medical Association and chairman of its obstetric section one year; a member of the Massachusetts Medical Society and of the Medical Society of Virginia, of the Washington Philosophical and Anthropological Society, and honorary Fellow of the British Gynecological Society.

With James R. Chadwick and Paul F. Mundé he created a desire among those doing gynecological work in America

for the creation of a national society in this country for the advancement of the knowledge and treatment of the diseases peculiar to women and of obstetrics. This resulted in the creation of the American Gynecological Society, in 1876, the first of its kind in the history of medicine. He was not only a founder, but was its secretary (1886–1890), its vice-president in 1891 and its president in 1899, serving on its council (1881–5 and 1897) and an honorary Fellow of it from 1915 to the date of his death.

Of our Association he became a Fellow in 1889, was its president ten years later and honorary Fellow from 1914 to the date of his death. It will be noted he was at the same time president of the American Gynecological Society and of the Southern Surgical and Gynecological Association, a distinction, I believe, never enjoyed before or since by anyone.

Entering his professional career at a date so proximate to the time of the work of the pioneers of American gynecology and obstetrics, and associating with several of them, among whom may be mentioned Sims, the Atlees, Peaslee, Emmet, Thomas, Byford, Goodell, Kollock, Battey, Eastman, Dunlop and Reamy, and imbued with the energy often attributed to the soil of New England, he found a field rich for cultivation. Competition was not then so keen in the various cities as today and hospital and college positions offered a greater potentiality for accomplishment and fame. Dr. Johnson made much of them and was from reading and travelling conversant with the steps of progress in these twin branches of medicine in Europe. He was mentally equipped to a remarkable degree and possessed very striking qualities of eloquence and affability. The foregoing facts would of necessity result in his being placed in a leading professional position and such was the result. His diagnostic skill was recognized by very many who believed themselves competent to estimate accurately such matters.

He was well known as a contributor to the science and literature of medicine. More than eighty papers were read and published by him and he contributed to Dennis's *System of Surgery* that portion entitled "Surgical Diseases of the Fallopian Tubes and Ovaries." Nine of his papers appear in the *Transactions* of the American Gynecological Society and ten of them in those of this Association. His early writings were largely upon obstetric subjects, but as his work extended proportionately more into gynecology and abdominal surgery, these furnished him themes for a predominant part of his writing.

In referring again to his long service as a teacher, I wish to quote Father Creeden's remarks in presenting Dr. Johnson with the honorary degree of LL.D., as suggestive of the appreciation of his associates and superiors for his teaching qualities. Father Creeden said: "Georgetown honors herself today in honoring the most noted alumnus of her school of medicine, Joseph Taber Johnson, whose persevering and unremitting work of teaching has endeared him to his Alma Mater, whose skilful surgery has indebted to him so many sufferers of mankind, whose words and writings have merited so much from his disciples and from the whole medical profession."

He has served as a bright example of accomplishment, scientifically and morally, in the community, by dint of inherent fine moral fibre, good preliminary training, an invincible energy, recognition of and grasping opportunities, and health sufficient to permit fifty years of work.

It is impossible to estimate even approximately the tremendous benefit to human kind such a life of service affords. Fortunately the estimate is apt to be too small.

He outlived both his wives and was survived by four adult children, one of whom is Dr. L. B. T. Johnson, of Washington, D. C.

J. Wesley Bovée.

W. O. Roberts

WILLIAM OWEN ROBERTS, M.D.

1848–1921

Dr. William O. Roberts was born in Lynchburg, Va., December 19, 1848. He removed with his family to Louisville, Ky., at the age of sixteen, where he died on April 1, 1921. He graduated in the medical department of the University of Louisville in 1874 and spent his entire professional life in that city. Soon after his graduation he married Miss Maria Yandell, daughter of a distinguished surgeon of Louisville, Dr. D. W. Yandell, with whom he was associated in practice for many years.

Soon after graduation, Dr. Roberts was appointed demonstrator of anatomy in the University of Louisville. Later he became lecturer on surgery and in time succeeded to full professorship of surgery in his alma mater. He was engaged for a great part of his time throughout his professional career as a teacher and won for himself the admiration of his pupils and the esteem of his colleagues. He was a member of the surgical staff of the Louisville City Hospital and of Sts. Mary and Elizabeth Hospital. For many years he was chief surgeon of the Louisville & Nashville Railroad. He also devoted a great portion of his time to private practice.

Dr. Roberts became a member of the Southern Surgical Association soon after its foundation and was a regular attendant upon the annual meetings. He was a frequent contributor to its *Transactions* and was President of the Association in 1910. He was a man of genial disposition and kindly nature and drew about him a large circle of

friends. On his seventieth birthday he was tendered a testimonial dinner by his professional friends. Throughout a long and distressing illness, during a great part of which time he was totally blind, he bore himself with remarkable fortitude and patience. He is survived by a daughter and son, the latter having succeeded him as surgeon to the Louisville & Nashville Railroad and also in private practice.

WILLIAM KOHLMANN, M.D.

1863–1921

Dr. William Kohlmann was born in Kirchheim, Germany, June 6, 1863. He was educated at the public schools of that town and the academies of Grünstadt and Kaiserslautern, and received his medical education at the University of Würzburg and the University of Heidelberg. Following his graduation, he engaged in general practice for a short time and later served as surgeon in the German army.

In 1891 he came to New Orleans, where, almost from the first, he occupied a position of prominence and leadership in the community. His skill and industry speedily won him a large private practice, and he was soon appointed to the staff of Touro Infirmary. He served as assistant house surgeon, 1893–1901, surgeon and physician-in-chief, 1901–1907, and was chief of the department of gynecology and obstetrics from 1907 until his death, in 1921. In 1897, he assisted in the establishment of a training-school for nurses at Touro, and in 1907 he was made a member of the advisory committee, as a representative of the medical staff, and an honorary member of the board of managers for life. In addition to the important positions he held at Touro, he was one of the chiefs of the department of obstetrics and gynecology in the New Orleans Charity Hospital, consulting gynecologist of the New Orleans Dispensary for Women and Children and professor of gynecology in the Post-graduate School of Loyola University. He belonged to

the New Orleans Medical Association, Southern Medical Association, American Medical Association, Southern Surgical Association, and was a Fellow of the American College of Surgeons. He was the author of numerous articles and pamphlets of unusual value and interest and was in frequent demand as a speaker.

Without warning, and in the midst of his labors, death came to him March 21, 1921, and he went, as he would surely have wanted to go, in the fulness of his powers and from active work. He was a great surgeon, skilful alike with hand and brain, wise and quick in his judgments, gentle and sure in their execution. He was a leader in the hospital field, capable, experienced, tried in many a stern ordeal and never failing to meet the test. He was a philanthropist of the truest sort—active in every good work, contributing not only of his means but also of his time and skill—and only the poor and unfortunate, who came to him for help and who never went away empty, knew the extent of his benefactions, for his was a charity that knew no bounds or creed. And more than all, he was a good man, held in respect and esteem by all who knew him, devoted to the noble profession to which he gave himself without stint, and honorable and honored alike in life and death.

INDEX

A

Abdominal pain, obscure, contracture of the psoas parvus as an explanation of, 84
Aneurysm, cirsoid, of the scalp, 362
enormous gluteal, ligation of internal iliac for, 362
of internal carotid in its cervical portion, 318

B

Baer, William S., the use of the bone-graft in the treatment of Pott's disease, 469, 522
discussion on contracture of the psoas parvus, 91
Baker, J. N., hernia of the bladder, with report of a case, 131, 147
Barr, Richard A., discussion on gastrojejunocolic surgery, 440
Black, William T., discussion on diverticula, 78
Bladder, female, primary carcinoma of, 33
hernia of, 131
Blair, Vilray P., saddle nose, 524, 527
Bloodgood, Joseph Colt, benign lesions of female breast for which operation is not indicated, 210, 237
Boldt, Hermann J., discussion on cancer, 41
on diverticula, 82
on radium or surgery, 187
Bone-graft, the use of, in the treatment of Pott's disease, 469
Bovée, J. Wesley, discussion on diagnosis of cancer of the breast, 235
Breast, female, benign lesions of, for which operation is not indicated, 210
the remaining, after radical removal of the opposite side for carcinoma, 223
Bryan, W. A., recurrence of the benign prostate, 542
discussion on mensuration in harelip, 518
Buist, A. J., discussion on skin suture without a fault, 253
on surgery of bloodvessels, 373
Bullet wound of femoral artery and vein successfully treated by ligation of the artery and vein and extirpation of the injured segment, 357
Burch, L. E., discussion on hernia, 144
Burnam, Curtis, F., treatment of cancer of the tongue, 24, 43

C

Cancer of the tongue, 24
Cannaday, John E., discussion on cholecystotomy, 100
Carcinoma, extensive basal-cell, surgical treatment of, 14
primary, of the female bladder, 33
the remaining breast after radical removal of the opposite side for, 223
Carotid artery, internal, aneurysm of, in its cervical portion, 318
Cholecystitis, bleeding ulcer of duodenum associated with, 400
Cholecystotomy, ideal, a valuable procedure in certain cases of cholelithiasis, 93
Cholelithiasis, ideal cholecystotomy a valuable procedure in certain cases of, 93
Cirsoid aneurysm of the scalp, 362
Cole, Herbert P., discussion on hernia, 139
on mensuration in harelip, 520
Coleman, C. C., surgical treatment of facial paralysis, 476, 523
discussion on intracranial hemorrhage, 206
on plastic surgery of the face, 527
Coley, Wiillam B.; Leigh, Southgate; Walker, John B.; Hopkins, C. W.; and Hutchison, J. A., report of the Medical Section of the Special Committee of American Railway Association on traumatic and industrial hernia, 290
Conservative surgery in nonmalignant diseases of the pelvic organs, 157
Cowden, Charles N., treatment of fibroid tumors, 385
Crile, George W., special points in surgery of the stomach, 395, 442
Crisler, J. A., discussion on diverticula, 80
Crook, Jere E., discussion on surgery of bloodvessels, 375
Crowell, Andrew J., discussion on contracture of the psoas parvus, 90
Cullen, Thomas S., further notes on diseases of the umbilicus, 598
discussion on diverticula, 76
on surgery of bloodvessels, 373

D

Danna, Joseph A., discussion on kangaroo tendon sutures, 122
on surgery of bloodvessels, 379
Diverticula, duodenal, 52
Diverticulum, Meckel's, 68
Downs, William A., duodenal diverticula, with a report of four cases, 52, 82
discussion on gastrojejunocolic surgery, 434
Du Bose, F. G., discussion on surgery of bloodvessels, 373
on radium or surgery, 185

Duodenal diverticula, 52
ulcer, choice of operations for, 414
Duodenum, bleeding ulcer of, associated with cholecystitis, 400

E

Enteroptosis, notes on, 502
Epiplopexy, present status of, 485

F

Facial paralysis, surgical treatment of, 476
Femoral artery and vein, bullet wound of, successfully treated by ligation of artery and vein and extirpation of the injured segment, 357
vein, septic thrombosis of, 353
Fibroid tumors, treatment of, 385
Finney, John M. T., discussion on cancer, 38
on diagnosis of cancer of the breast, 233
on gastrojejunocolic surgery, 434
Fistulas, gastrojejunocolic, following gastroenterostomy, 421

G

Gastroenterostomy, gastrojejunocolic fistulas following, 421
jejunal ulcer without previous, 265
Gibbon, John H., discussion on diagnosis of cancer of the breast, 233
on cancer of the tongue, 42
on gastrojejunocolic surgery, 438
and Flick, John B., the present status of epiplopexy, with a report of ten cases, 485
Guerry, Le Grand, choice of operations for duodenal ulcer, 414
Gwathmey, Lomax, discussion on diagnosis of cancer of the breast, 236

H

Haggard, William D., cirsoid aneurysm of the scalp, 369, 383
discussion on cancer of the tongue, 40
on diagnosis of cancer of the breast, 236
ligation of the internal iliac for enormous gluteal aneurysm, 362
Hagner, Francis R., discussion on hernia, 139
Hall, Rufus B., discussion on diagnosis of cancer of the breast, 231
Harelip operations, the value of mensuration in, 461

Hematurias, essential, so-called, ureteral stricture an important factor in, 547
Hemorrhage, traumatic intracranial, 192
Hernia, diaphragmatic, operation for, 124
last word in, 106
of the bladder, 131
traumatic and industrial, report of the Medical Section of the Special Committee of the American Railway Association on, 290
Hill, Robert S., discussion on radium or surgery, 184
Hogan, E. P., conservative surgery in nonmalignant diseases of the pelvic organs, 157, 190
discussion on cholecystotomy, 102
Horsley, J. Shelton, surgical treatment of extensive basal-cell carcinoma, 14, 43
discussion on diagnosis of cancer of the breast, 229
on cholecystotomy, 100
on gastrojejunocolic surgery, 437
Hunner, Guy L., ureteral stricture, an important etiological factor in the so-called essential hematurias, 547
discussion on radium or surgery, 188

I

Ileum, terminal, straight vessels of, 346
Iliac, internal, ligation of, for enormous gluteal aneurysm, 362
In memoriam:
Bosher, Lewis Crenshaw, 641
Grant, Horace H., 643
Johnson, Joseph Taber, 655
Jones, Edward Groves, 649
Kohlman, William, 661
McRae, Floyd Wilcox, 653
Perkins, W. M., 651
Ransohoff, Joseph, 645
Roberts, William O., 659
Intracranial hemorrhage, traumatic, 192

J

Jejunal ulcer without previous gastroenterostomy, 265
Jonas, Ernst, discussion on cholecystotomy, 100
on diverticula, 80
on hernia, 138
on skin suture without a fault, 253

Judd, E. Starr, bleeding ulcer of duodenum associated with cholecystitis, 400, 442
discussion on cholecystotomy, 102
on surgery of bloodvessels, 378

K

Kelly, Howard A., discussion on radium or surgery, 182
Kerr, Harry H., discussion on intracranial hemorrhage, 205
Kidney infections, nontubercular, consideration of, 524
Kirchner, Walter C. G., the factor of obesity in surgical operations, 445

L

La Roque, G. Paul, another case of bullet wound of the femoral artery and vein successfully treated by ligation of the artery and vein and extirpation of the injured segment, 318, 384
Law, Arthur A., pelvic tumors with sacral attachments, 242
discussion on bone-graft in Pott's disease, 517
Lewis, Dean, discussion on diverticula, 77
Ligation of internal iliac for enormous gluteal aneurysm, 362
Long, John Wesley, discussion on cancer of the breast, 241
on cholecystotomy, 102
on hernia, 146
on kangaroo tendon sutures, 123
on surgery of bloodvessels, 381

M

McGlannan, Alexius, Meckel's diverticulum, 68, 83
discussion on intracranial hemorrhage, 207
McGuire, Stuart, discussion on skin suture without a fault, 253
Marcy, Henry O., the last word in hernia, 106
discussion on cancer, 37
on cholecystotomy, 101
on kangaroo tendon sutures, 123
on gastrojejunocolic surgery, 433
Mason, J. M., occlusion of the mesenteric vessels, 348, 383
discussion on contracture of the psoas parvus, 90
on hernia, 128
on kangaroo tendon sutures, 122
Mayo, Charles H., and Rankin, Fred W., gastrojejunocolic fistulas following gastroenterostomy, 421, 443

Meckel's diverticulum, 68
Mensuration, the value of, in harelip operations, 461
Mesenteric vessels, occlusions of, 343
Miller, C. Jeff, final results in 183 cases of myoma of the uterus and myopathic bleeding treated with radium, 149, 190
discussion on diagnosis of cancer of the breast, 234
Miller, Robert T., Jr., discussion on hernia, 141
Mixter, Samuel J., discussion on intracranial hemorrhage, 204
on mensuration in harelip, 519
on saddle nose, 526
Morris, Robert T., notes on enteroptosis, 502
discussion on cholecystotomy, 101

N

Newell, E. Dunbar, discussion on intracranial hemorrhage, 205
Nicolson, William Perrin, traumatic intracranial hemorrhage, 192, 208
discussion on diverticula, 78
Noland, Lloyd, contracture of the psoas parvus as an explanation of obscure abdominal pain in certain cases, 84, 91
Nontubercular kidney infections, consideration of some, 524
Nose, saddle, 524

O

Obesity, the factor of, in surgical operations, 445
Ochsner, Edward H., a skin suture without a fault, 252, 253
discussion on bone-graft in Pott's disease, 517
on sarcoma, 51
Occlusions of the mesenteric vessels, 343
Osteomyelitis, in association with periosteal sarcoma, 45

P

Paralysis, facial, surgical treatment of, 476
Parham, F. W., discussion on diagnosis of cancer of the breast, 236
on diverticula, 79
on surgery of bloodvessels, 382
on transposition of viscera, 261
Payne, R. L., straight vessels of the terminal ileum, 346
discussion on epiplopexy, 520
Peck, Charles H., discussion on gastrojejunocolic surgery, 439
Pelvic organs, conservative surgery in nonmalignant diseases of, 157
tumors with sacral attachments, 242
Peterson, Reuben, the value of the pneumoperitoneal *x*-ray in obstetrics and gynecology based upon the experience of over 300 cases, 308

Pneumoperitoneal *x*-ray, the value of, in obstetrics and gynecology, 308
Pott's disease, the use of the bone-graft in the treatment of, 469
President's address, 1
Prostate, benign, recurrence of, 542
Psoas parvus, contracture of, as an explanation of obscure abdominal pain, 84

R

Radium, 183 cases of myoma of the uterus and myopathic bleeding treated with, 149
Reconstruction of female urethra and vesical sphincter, 505
Rhodes, R. L., periosteal sarcoma in association with osteomyelitis, report of three cases, 45
discussion on gastrojejunocolic surgery, 436
Richardson, Edward H., reconstruction of the female urethra and vesical sphincter, 505
Richardson, Edward P., jejunal ulcer without previous gastroenterostomy, 265
Robins, Charles R., discussion on gastrojejunocolic surgery, 441
on radium or surgery, 189
Royster, Hubert A., discussion on transposition of viscera, 263

S

Sacral attachments, pelvic tumors with, 242
Saddle nose, 524
Sarcoma, periosteal, in association with osteomyelitis, 45
Scalp, cirsoid aneurysm of, 362
Scott, A. C., discussion on hernia, 144
Sherk, Henry H., total transposition of viscera, 255, 264
Simpson, James K., discussion on hernia, 140
Skin suture without a fault, 252
Smythe, Frank D., discussion on diverticula, 81
Stomach, surgery of, special points in, 395
Stone, Harvey B., operation for diaphragmatic hernia, 124, 146
Stone, I. S., primary carcinoma of the female bladder, with report of a case, 33, 43
discussion on diagnosis of cancer of the breast, 232
on hernia, 141
Stricture, ureteral, an important etiological factor in the so-called essential hematurias, 547
Sullivan, Raymond P., a consideration of some nontubercular kidney infections, 528
Surgery of the stomach, special points in, 395

Surgical operations, the factor of obesity in, 445
treatment of facial paralysis, 476
Suture, skin, without a fault, 252

T

Talley, Dyer Findley, report of another case of septic thrombosis of the femoral vein, 358
Thompson, James E., the value of mensuration in harelip operations, 461, 522
discussion on diverticula, 77
on saddle nose, 526
on surgery of bloodvessels, 375
Thrombosis, septic, of femoral vein, 353
Tongue, cancer of, treatment of, 24
Truesdale, P. E., discussion on hernia, 142
Trout, Hugh H., the remaining breast after radical removal of the opposite side for carcinoma, 223

U

Ulcer, bleeding, of duodenum associated with cholecystitis, 400
duodenal, choice of operations for, 414
Umbilicus, diseases of, further notes on, 598
Urethra, female, reconstruction of, and vesical sphincter, 505
Uterus, 183 cases of myoma of, and myopathic bleeding treated with radium, 149

V

Viscera, total transposition of, 255

W

Watson, Stephen H., discussion on facial paralysis, 516
Willis, A. Murat, ideal cholecystotomy, a valuable procedure in certain cases of cholelithiasis, 93, 104
Winslow, Nathan, aneurysm of internal carotid artery in its cervical portion, 323
Winslow, Randolph, president's address, 1
discussion on diverticula, 79
on hernia, 145

X

X-ray, pneumoperitoneal, the value of, in obstetrics and gynecology, 308

Date Due

JA 31 '50

Library Bureau Cat. No. 1137